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TO: RAVI SANGA (EPA)

FROM: PHILIP SPADARO, P.G. AND BOB ROMAGNOLI, P.E.

SUBJECT: JORGENSEN FORGE OUTFALL SITE - STEEL SHEET PILE WALL DESIGN MEMORANDUM

DATE: JANUARY 10, 2014

APPROVED BY: MILES DYER (JORGENSEN FORGE CORPORATION)

(SEE ATTACHED EMAIL)

WILLIAM ERNST (THE BOEING COMPANY)

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Date: 2014.01.10 14:03:42 -08'00'

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1. Introduction

This Steel Sheet Pile (SSP) Wall Design Memorandum (Design Memo) has been prepared on behalf of Jorgensen Forge Corporation (JFC) and The Boeing Company (Boeing) (collectively known as the Owners) pursuant to the Second Modification for Administrative Order on Consent for Removal Action (Order) at the Jorgensen Forge Outfall Site (JFOS) (Second Modification, EPA, 2013a), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Docket No. 10-2011-0017, signed by JFC, Boeing and the U.S. Environmental Protection Agency (EPA) on June 25, 2013. As stipulated in the Second Modification, the Owners have agreed to install a SSP wall along the Lower Duwamish Waterway (LDW) shoreline bank at the northwestern corner of the JFC property and the southwestern corner of the Boeing Plant 2 property. The purpose of this Design Memo is to present two potential SSP options for

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EPA's consideration, both of which meet the intent of the Second Modification, along with that of EPA's letter dated December 2, 2013 (EPA, 2013b).

The JFC Property is located in the municipality of Tukwila, King County, Washington (Figure 1), and is bounded by Boeing Plant 2 to the north, East Marginal Way and King County International Airport (KCIA) to the east, Boeing Isaacson Property to the south, and the LDW to the west (Figure 2). The JFOS encompasses a portion of both the JFC Property and Boeing Plant, and is the focal point of this Design Memo.

As further described herein, installation of this new SSP structure is a significant component of two relatively larger environmental remediation projects. The first project (known as the JFOS, and subject of the above-referenced Order) involves the investigation and clean-up of contamination related to former property line storm drain outfalls located along JFC property (see Figure 3). Work associated with this project (including the SSP installation) is intended to control the potential discharge of polychlorinated biphenyls (PCBs) and other hazardous substances from the JFOS directly to the LDW.

The second related project is known as the Jorgensen Forge Early Action Area (JFEAA), which focuses on the dredging/excavation of LDW shoreline materials and sediments. A portion of this remedial area is presented in Figure 3, while a more comprehensive representation is presented in Anchor QEA's (AQEA) Addendum 2 to the JFEAA Contract Documents (AQEA, 2013a). A segment of the targeted bank soils/sediments (known as JFOS Impacted Shoreline Material) will be directly supported by the proposed SSP wall. The program is scheduled to begin in the summer of 2014, and is being led by Earl M. Jorgensen (EMJ), the former owner of the JFC property.

A third (yet unrelated) project, located immediately adjacent to the JFEAA (partially depicted in Figure 3), is being undertaken by Boeing. Known as the Duwamish Sediment Other Area (DSOA) and Southwest Bank Interim Measure, this work is currently on-going, and will continue into 2015. While the technical components of this project do not necessarily have a bearing on the enclosed SSP design, it is at least worth acknowledging the program from a coordination and logistical perspective.

Each of these remedial programs is discussed further in Section 2.

1.1 Memo Organization

This Design Memo presents two separate SSP wall design options: the Cofferdam design (Option 1) and the Shoreline Wall design (Option 2) (see Figures 4 and 5, respectively). As shown, the primary difference between the two relates to the presence (or lack thereof) of an in-water cofferdam structure used to enclose the JFOS Impacted Shoreline Material excavation activities.

In addition to an abbreviated background section, this memorandum provides the rationale for both SSP options, along with details necessary to support a 60% design for each. The respective project schedules are also discussed for reference.

2. Background

The LDW is located south of downtown Seattle, and extends over the northern five miles of the Duwamish River to the southern tip of Harbor Island. Industrial discharges, storm drains and combined sewer overflows have all impacted LDW surface water and sediments over the past 100

years (EPA, 2013c). As such, the LDW is the subject of on-going environmental investigations and removal actions resulting from the identification of contaminants, most notably PCBs, which have contributed to the long-term degradation of the LDW environment.

This SSP installation project is just one of many remedial actions being planned and/or conducted within the LDW. A brief description of those projects located in the vicinity of the JFC and Boeing Plant 2 properties is provided below.

2.1 Jorgensen Forge Outfall Site

As illustrated in Figure 3, the JFOS encompasses two former storm water outfalls: one 24-inches in diameter, and the second 12-inches. These combination clay and corrugated metal pipes originally conveyed storm water runoff and surface water from JFC, Boeing Plant 2, KCIA, and East Marginal Way South to the LDW (SES, 2013a). As detailed in the *Action Memorandum for the Jorgensen Forge Outfall Site, Seattle, King County, Washington* (EPA, 2010a), numerous environmental investigations have documented the presence of elevated PCB concentrations in the outfalls. Due to these findings, EPA issued the original JFOS Order to investigate, clean and seal the clay section of the pipes. This work was completed in 2011, and is documented in the *Source Control Action Completion Report* (Floyd | Snider, 2011).

The Order also called for soil characterization activities in and around the CMP section of the outfalls, which were documented to be in poor condition. The first phase of investigation included 12 direct-push borings advanced to a depth of 15 to 25 feet below ground surface (bgs). Based on the results, the Order was amended (First Modification) to require further soil characterization, subsequently referred to as Phase 2 (EPA, 2012).

Phase 2 included 12 more direct-push borings, this time to a maximum depth of 38.8 feet bgs (AQEA and Farallon, 2012). PCBs exceeding 1 milligram per kilogram (mg/kg) were found at the maximum penetration depth for three of the borings, suggesting that the vertical extent of PCBs was not completely defined at these locations (SoundEarth Strategies, Inc. [SES], 2013a). As part of a subsequent Phase 3 investigation, three additional borings were advanced in an attempt to fill these remaining data gaps. In summary, the three JFOS soil investigations determined that total PCBs exceeding 1 mg/kg were present at 32 feet bgs or less.

In addition to the above, a Second Modification to the Order called for further sampling; this time to characterize material located beneath the targeted JFEAA excavation limits (i.e., JFOS Impacted Shoreline Material, previously known as "the Blue Wedge"). Completed in October 2013, this work included the collection of four angle borings to define the western lateral extent of the PCB contaminated soil greater than 1 mg/kg. As presented in the *Data Report of Soil Quality Angle Boring Results* (SES, 2013b), these data showed the presence of elevated PCB concentrations, and helped to delineate a portion of the JFEAA excavation limits (see Section 2.2).

2.2 Jorgensen Forge Early Action Area

EMJ entered into an Administrative Order on Consent with EPA on July 10, 2003 (EPA Docket No. CERCLA-10-2003- 0111) to investigate whether the JFC Facility, which is currently owned and operated by JFC, and formerly owned and operated by EMJ, is or has been a source of PCBs to the LDW. The analytical results of samples collected during the investigation detected concentrations of PCBs in the shoreline bank adjacent to the Facility. EPA determined that these concentrations present a risk to human health and the environment, and met the criteria for

conducting a Non-time-critical Removal Action (NTCRA) under CERCLA. The EPA-approved Removal Action Boundary was identified as approximately 1.6-acres in size, and is partially depicted in Figure 3.

Pursuant to EPA Region 10 CERCLA Docket No. 10-2013-0032, the NTCRA will consist of in-water dredging, shoreline excavation, placement of backfill and armor materials, transport and off-site disposal of impacted sediments and soils, and associated construction and monitoring activities (EPA, 2011). The project's design was recently submitted to EPA (AQEA, 2013a), and construction activities are scheduled to commence in July of 2014, with in-water work beginning August 1, 2014. As indicated previously, JFOS Impacted Shoreline Material will be excavated as part of this project. Given the fact that a portion of the new SSP wall is needed to support this excavation, EPA has stated that it is critical that the SSP installation be completed by this time.

2.3 Boeing Remedial Actions

Boeing Plant 2 was built in the late 1930s and was a major aircraft manufacturing facility during World War II. Plant 2 is currently a Resource Conservation and Recovery Act (RCRA) permitted hazardous waste facility, and Boeing is under an EPA Order (RCRA Docket No. 1092-01-22-3008(h), issued in 1994 to investigate and study cleanup options for this facility (Floyd | Snider, 2010). Samples collected during the RCRA Facility Investigation indicated that PCBs were wide-spread in sediments fronting the facility, and that other constituents (including metals, Semi Volatile Organic Compounds [SVOCs] and phthalates) were present at various locations throughout the property (Floyd | Snider, 2010).

Boeing is currently conducting the DSOA and Southwest Bank Interim Measure as part of the Order issued by EPA in 1994 (Floyd | Snider, 2010). In June of 2003, the DSOA was identified as one of the Early Action Areas of the LDW. Boeing conducted several sediment investigations adjacent to the Boeing Plant 2 after receiving comments from EPA on a Draft Alternative Corrective Measures Evaluation Report. Between 2006 and 2009, additional sediment samples were collected to better refine the extent of elevated PCB concentrations (Floyd | Snider, 2010).

In August 2011, EPA released a Final Decision and Response to Comments for the cleanup of the sediments and shoreline materials at Boeing Plant 2, located on the northern boundary of the JFC property. EPA selected the preferred alternatives described in the Statement of Basis for Boeing Plant 2 sediments. These alternatives utilize variable depth dredging to remove all contaminated sediment and bank soil above the state Sediment Quality Standards, backfilling with clean material. Boeing began implementation of the sediment cleanup in January 2013, and operations are expected to continue into 2015 (EPA, 2013d).

In addition to the DSOA, Boeing installed a sheet pile containment system in the former location of the 2-66 building (See Figure 3) in 1995 to control migration of contaminated groundwater. Subsurface obstructions (i.e., logs) prevented the required sheet pile installation depth of 50 feet for 15 of the sections of sheet piling. Ten of these 15 piles were installed to depths of 48 feet or greater (Weston, 1995). It will be important that installation of the new SSP does not impact this existing structure.

3. Summary of SSP Design Options

This section presents the rationale for each of the two SSP design options: Cofferdam and Shoreline Wall. For each, a description of the proposed layout is provided, together with preliminary construction drawings. This Design Memo, which represents a 60% design, serves to

build upon the engineering assessment presented in the *Basis of Design Report* (BODR) previously submitted and approved by EPA (SES, 2013a).

Before each option is discussed in detail, some overarching design objectives are first presented. These factors are generally common to both designs, and are considered critical to the development of the overall project.

3.1 Design Objectives

In general, the SSP installation is meant to meet the requirements of the Second Modification. More specifically, it will serve to:

- Eliminate the potential for PCB contaminant migration from the JFOS to the LDW; and
- Allow for the removal of JFOS Impacted Shoreline Material (to be conducted by EMJ pursuant to EPA CERCLA Docket No. 10-2013-0032).

The design also seeks to meet the requirements set forth in EPA's December 2, 2013 and December 20, 2013 letters to the Owners, both of which stress the need to meet established design and construction deadlines, including:

- Submitting SSP Design Memo: January 10, 2014 (this memo)
- Ordering SSP materials: January 31, 2014
- Beginning SSP Installation: No later than April 1, 2014
- Beginning JFEAA in-water work (by others): August 1, 2014

These dates are accounted for in the project schedules referenced herein. The Owners are very sensitive to such deadlines, and seek to work closely with all parties to comply accordingly.

3.2 Design Considerations

Considering the various projects that surround the SSP work, it was critical to first understand the sequencing of each field operation. The relative timing of such events played a significant role in designing the SSP wall reflected in this package.

Based on discussions with EPA, the Washington State Department of Ecology (Ecology), and other private parties involved in this matter, the Owners understand that the relevant projects will proceed in the following general order:

- Boeing DSOA (currently on-going)
- In-water SSP installation (by March 7, 2014, depending upon selected SSP option)
- Upland SSP installation (to start no later than April 1, 2014)
- Partial excavation of upland JFOS soil (potentially required to facilitate structural support)
- JFEAA in-water work (to begin August 1, 2014)
- Excavation of JFOS Impacted Shoreline Material
- Removal of In-water SSP (depending upon selected SSP option)

From a technical perspective, each design option took into account (among other things) the following factors:

- Existing chemical data;
- Existing general field conditions;
- Existing hydrogeological conditions;
- Existing geotechnical conditions;
- Anticipated loads and conditions associated with the various construction, excavation, and removal stages;
- Anticipated wall deflections;
- Anticipated unbalanced excavations on one or both sides of each wall;
- River stages (as applicable); and
- Potential sediment scour conditions (as applicable).

The Owners also seek to prevent impact to any existing adjacent structures, not the least of which includes the Boeing Plant 2 sheet pile wall.

The Owners understand that EPA will define the pertinent Applicable or Relevant and Appropriate Requirements (ARARs) for the project. While actual Federal and State permits will not be required, the project will still need to meet the substantive requirements of such ARARs. Once identified, the Owners will work closely with EPA and the selected contractor to ensure appropriate compliance.

3.3 Design Options

Each of the two design options is described further below and in the associated preliminary design drawings. A portion of the targeted soils located within the upland enclosure may be removed/managed to lessen earth pressures. Specifically, the top 5 to 10-feet of material may need to be removed as part of this project (see Figures 4 and 5). Based on existing upland PCB data, the first 7 feet of this material is considered non-TSCA (i.e., greater than 1 mg/kg but less than 50 mg/kg). The bottom 3 feet of material has the potential to contain PCBs greater than 50 mg/kg. Any soil removed will be stockpiled and characterized to determine the appropriate disposal options.

3.3.1 Option 1: Cofferdam Design

The Cofferdam Option, as shown in Figure 4, consists of two separate (but connected) enclosures: one to contain the in-River JFOS Impacted Shoreline Material excavation, and the other to contain the potential upland soils removal action. The upland enclosure is shown for conceptual purposes only and full construction of it may not be necessary to support the cofferdam. The Owners are currently reassessing the upland structural components needed for this project. Appendix A provides preliminary illustrative drawings for purposes of this Design Memo. In addition, Appendix C provides a listing of specifications currently anticipated for the project.

Unlike Option 2, this approach serves to (among other things) minimize the release of PCB-containing soils/sediments during excavation of the JFOS Impacted Shoreline Material by enclosing the in-water operation with SSP (i.e., cofferdam).

3.3.1.1 Horizontal and Vertical Extents

The Owners (in coordination with Ecology and EPA) undertook several field investigations between 2011 and 2013 to characterize the horizontal and vertical extent of PCBs in the vicinity of the two storm water outfalls. Data generated from such investigations drove the SSP designs contained in this Design Memo. A more complete summary of these characterization efforts is provided in the *Basis of Design Report* (SES, 2013a), and in the background section above.

Overall, TSCA and non-TSCA materials were identified. In the upland area, the vertical extent of PCB contamination ranges to depths of approximately 32 feet bgs (approximate elevation -13 feet Mean Lower Low Water [MLLW]). The lateral extent of non-TSCA soil is generally bound in a 30 by 70 feet area (SES, 2013a), and extends to a depth of 7 feet bgs. This material is also generally found between 25 and 32 feet bgs. The known extent of soil exceeding 50 mg/kg (i.e., TSCA) is represented by a smaller region, generally bound in a 20- by 30-foot area at depths between 7 and 25 feet bgs (SES, 2013a).

Using the previously mentioned angle boring data, AQEA developed the removal area boundaries (both horizontal and vertical) associated with the JFOS Impacted Shoreline Material. Representative excavation areas/depths are shown in AQEA's Second Addendum to the JFEAA Contract Documents (AQEA, 2013a). As indicated, the excavation reaches a maximum depth of -15 feet MLLW.

3.3.1.2 Design Features

Given the extent of removal described above, the SSP wall will need to withstand the various pressures exerted on it (see Appendix A for preliminary pressure diagrams). Depending upon the situation, pressure could emanate from either or both sides of the wall, and with varying amounts of force. Therefore, understanding the potential field conditions at any given time is critical to the overall SSP design. For example, at the point of the deepest cut within the JFOS Impacted Shoreline Material removal area, the adjacent SSP wall would need to withstand significant cantilever (i.e., over-turning) pressures. This is due to the fact that soil will be present on the opposite side. Similarly, the upland enclosure is meant to withstand forces generated by future soil cuts of up to 32 feet bgs. Of course in the shorter term, the SSP could endure forces generated by the removal of only the top 5-10 feet of material (described previously).

As shown in Appendix A, the entire SSP wall (both in-water and upland) will consist of AZ sheet piles (or available suitable equivalents). It is anticipated that such steel will be procured directly by the Owners. Because of the criticality of the upland SSP wall in providing support for both the in-water portion of the project, as well as the subsequent upland remediation work under a separate Order modification, it may be necessary to revisit and revise certain aspects of the Appendix A design for the upland portion of the cofferdam wall.

To help facilitate installation of the SSP, a portion of existing rip rap located on the Boeing Plant 2 Property will need to be removed/stockpiled as will any rip rap or debris within the footprint of the cofferdam. The upland work area will be surrounded by temporary chain link security fencing. This will remain in place until all JFOS work activities under this Order are completed.

3.3.1.3 Schedule

In order to meet the regional fish window deadline, all in-River structures would be constructed no later than March 7, 2014. The remainder of the SSP associated with this option would follow thereafter. Two to three weeks is the expected construction timeframe. It is expected that the entire project would be completed by the end of April 2014, which would allow for the JFEAA in-

water work to begin by the August 1, 2014 deadline. A complete schedule will be provided to EPA once EPA has selected this option, the sheetpile steel has been ordered, and the installation contractor has been chosen and is under contract.

In terms of the removal sequence, once the partial removal of the upland soils was completed, JFOS Impacted Shoreline Materials could then be excavated as part of the JFEAA project. Following that, the in-water walls would be removed as soon as practical. Excavation of the remaining upland soils would then follow at a later date under a separate Order modification.

3.3.2 Option 2: Shoreline Wall Design

This option, as illustrated in Figure 5, includes two primary components: an upland SSP wall that extends approximately 120 feet along the top of bank, along with an attached (and previously described) upland enclosure. Appendix B provides preliminary illustrative drawings for purposes of this Design Memo, while Appendix C provides a listing of anticipated specifications.

Different from Option 1, there would be no SSP enclosure within the River. Instead, the top-of-bank SSP would serve to support excavation depths on either side of it. The purpose of the upland enclosure is exactly as described in Option 1.

3.3.2.1 Horizontal and Vertical Extents

Layout of the straight run of wall (parallel to the shoreline) was developed by AQEA (AQEA, 2013a) in consideration of, among other things, the JFEAA project and existing upland conditions (i.e., location of rip-rap). In this case, removal of the JFOS Impacted Shoreline Material (including both TSCA and non-TSCA material) would occur without any type of SSP enclosure. As such, to avoid any material sloughing, the allowable limits of excavation are extended well beyond the neat cut lines (see AQEA, 2013a and Figure 5).

Limits of the upland enclosure are as described under Option 1.

3.3.2.2 Design Features

As mentioned above, most of the JFOS Impacted Shoreline Material excavation would proceed without any structural support. Of course the exception to this would be associated with that material removed adjacent to the shoreline wall itself, as the SSP would be designed to withstand such cuts (described in Option 1).

As shown in Appendix B, the entire SSP wall will consists of AZ-piles (or available suitable equivalent), along with any necessary whalers/bracing. It is anticipated that such steel will be procured directly by the Owners. The Owners are still evaluating the most practicable and cost-effective approach to the Option 2 wall design.

Similar to Option 1, and to help facilitate installation of the SSP, a portion of existing rip rap located on the Boeing Plant 2 Property will need to be removed/stockpiled. The upland work area will be surrounded by temporary chain link fencing. This will remain in place until all JFOS work activities under the Order are completed.

3.3.2.3 Schedule

Different from the Cofferdam Option, all SSP wall components would be located along upland portion of the properties; therefore, the fish window deadline (March 7) would not apply. In this case, SSP installation activities would need to begin no later than April 1, 2014.

Under this option, it is expected that the necessary steel would be delivered to the site by mid-February, in anticipation of installing the SSP wall later that month. Overall, this would allow for the JFEAA in-water work to begin by August 1, 2014.

A complete construction schedule will be provided to EPA once EPA has selected this option, the sheetpile steel has been ordered, and the installation contractor has been chosen and is under contract.

4. Discussion

This Design Memo presents two SSP designs for EPA consideration. While both are effective at meeting the project objectives, we suggest that one is likely to be more protective of the LDW as a whole. In particular, Option 1 encloses the in-water excavation of the JFOS Impacted Shoreline Material, shown to contain PCBs in excess of 50 mg/kg. This containment effectively serves to minimize the release of any resuspended fines (and associated PCBs), which if unchecked, could potentially result in the recontamination of surrounding LDW areas. Option 1 also allows for a more controlled operation, one which minimizes the potential for material sloughing, and greatly increases the accuracy of excavation. This in turn leads to a cleaner, more sustainable and precise process.

The key to this option is ensuring that the in-water SSP can be installed no later than March 7, 2014. As indicated previously, our current schedule suggests that this is possible. However, among other things, much depends upon EPA's approval of this Design Memo. The sooner that occurs, the sooner the Owners can commit to a steel supplier.

The downside of Option 2 is that, without an in-water enclosure, the JFOS Impacted Shoreline Material removal operations would pose a greater threat to the LDW water quality, and increase the potential for recontamination of adjacent areas. Also, it will result in the need to excavate a significant amount of material for the sole purpose of mitigating material sloughing during excavation. This corresponds to inflated (and largely unnecessary) costs for material excavation, management, transport and disposal, resulting in a much less sustainable remedial option.

As previously suggested, and as discussed in recent regulatory meetings, the Owners are strong proponents of the Cofferdam Option. Regardless, JFC and Boeing look forward to hearing from EPA so that this important work may proceed.

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Roy F. Weston, Inc . 1995. Construction Completion Report, Interim Corrective Action, Buildings 2-10 and 2-66. February.

From: Miles Dyer [mailto:mdyer@columbuscastings.com]
Sent: Friday, January 10, 2014 3:10 PM
To: Bob Romagnoli
Cc: Miles Dyer (mdyer@jorgensenforge.com)
Subject: Re: Revised Memo

Please attach this email as an approval for the design memo to be released today by TIG, 10 January 2014 to EPA.

Thanks,

Miles Dyer

Data Location: Syracuse Created By: mturnquist Modified By: mturnquist
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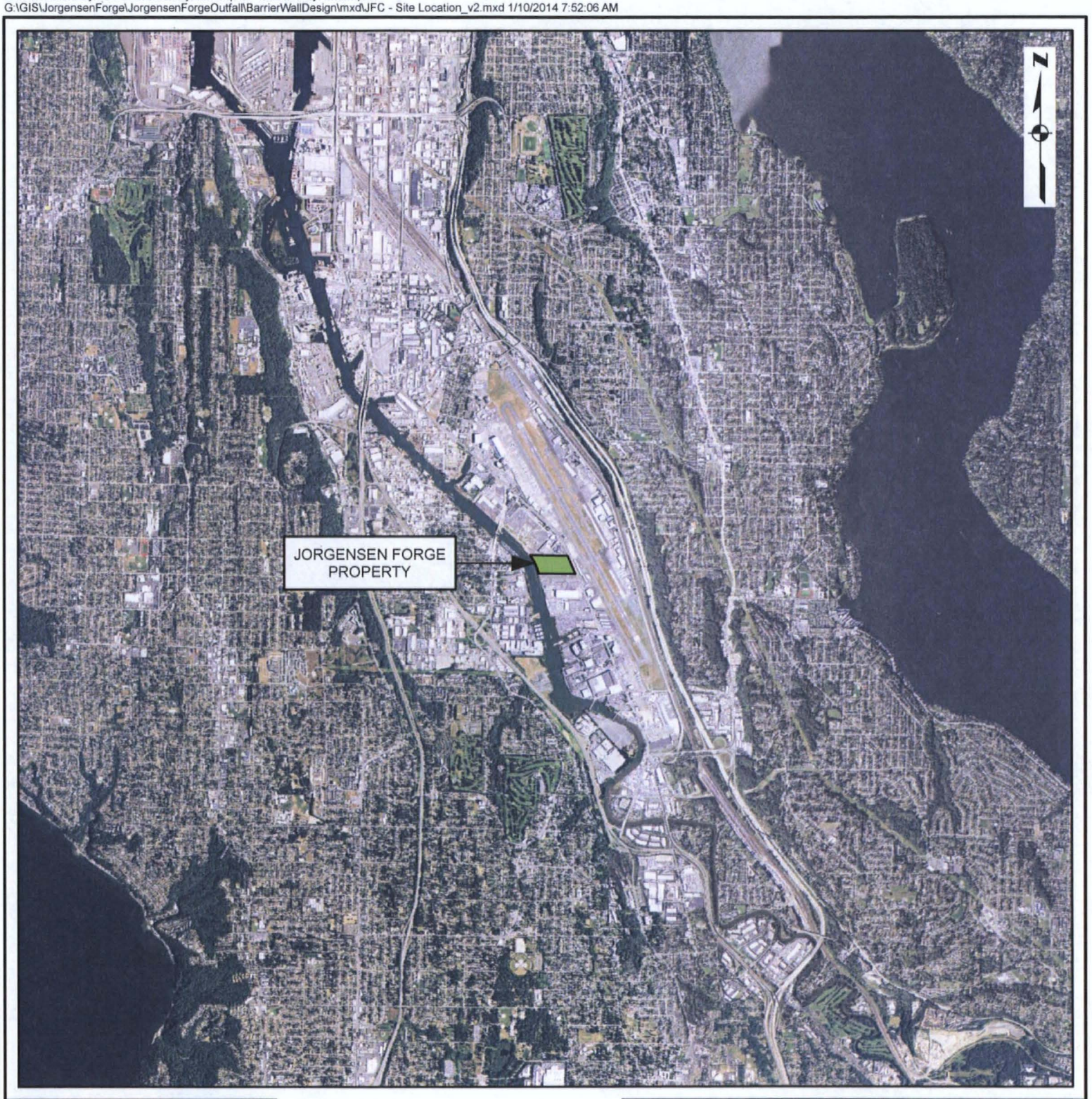

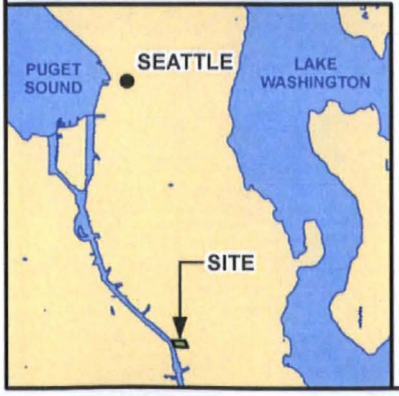

NOTE:

1. AERIAL IMAGERY PROVIDED BY THE UNITED STATES GEOLOGICAL SURVEY COLLECTED IN 2013 AS PART OF THE NATIONAL AGRICULTURE IMAGERY PROGRAM.

0 5,000 10,000 Feet

GRAPHIC SCALE

FIGURE 1

JORGENSEN FORGE PROPERTY LOCATION

JORGENSEN FORGE CORPORATION/THE BOEING COMPANY
JORGENSEN FORGE OUTFALL SITE
STEEL SHEET PILE DESIGN MEMORANDUM

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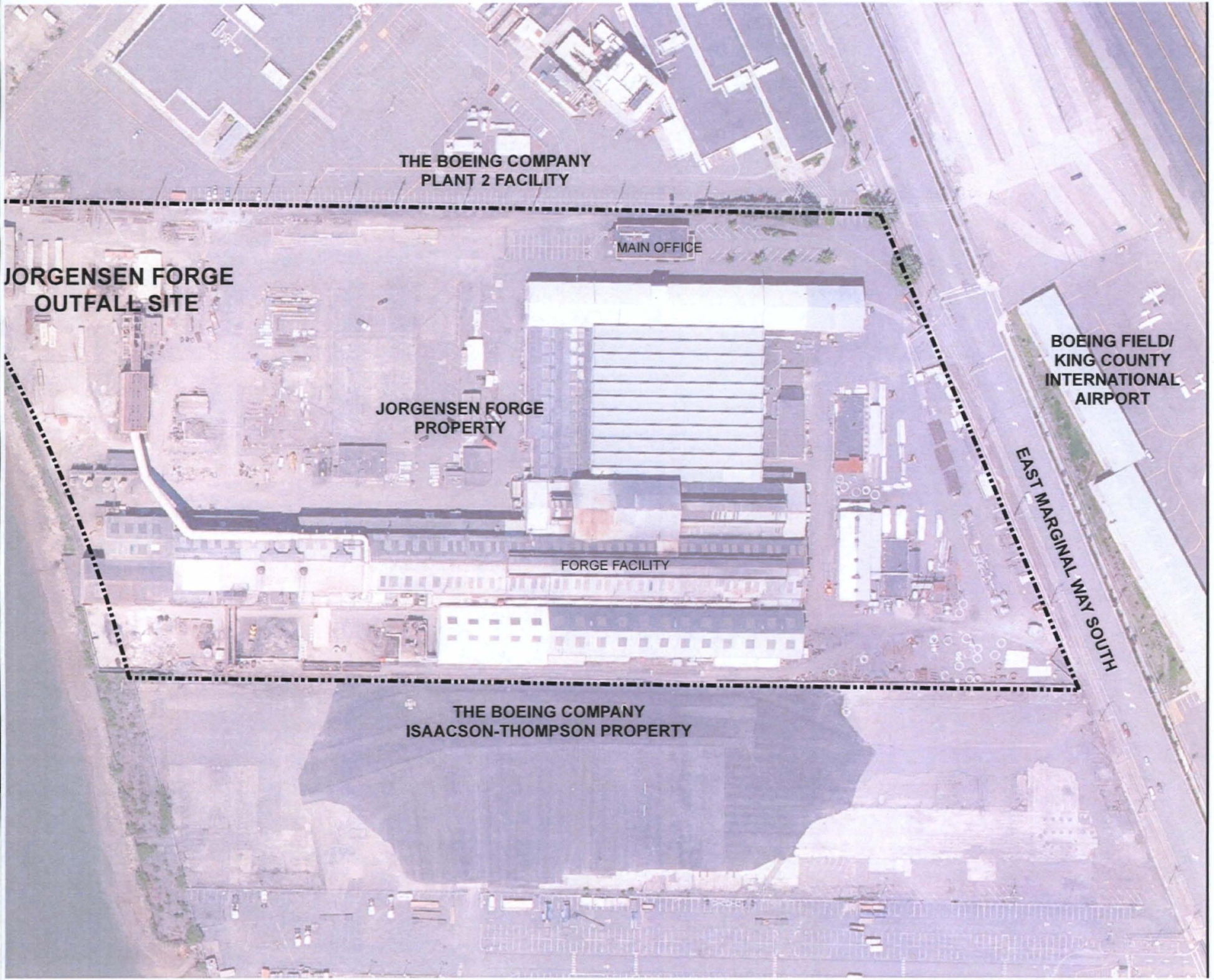

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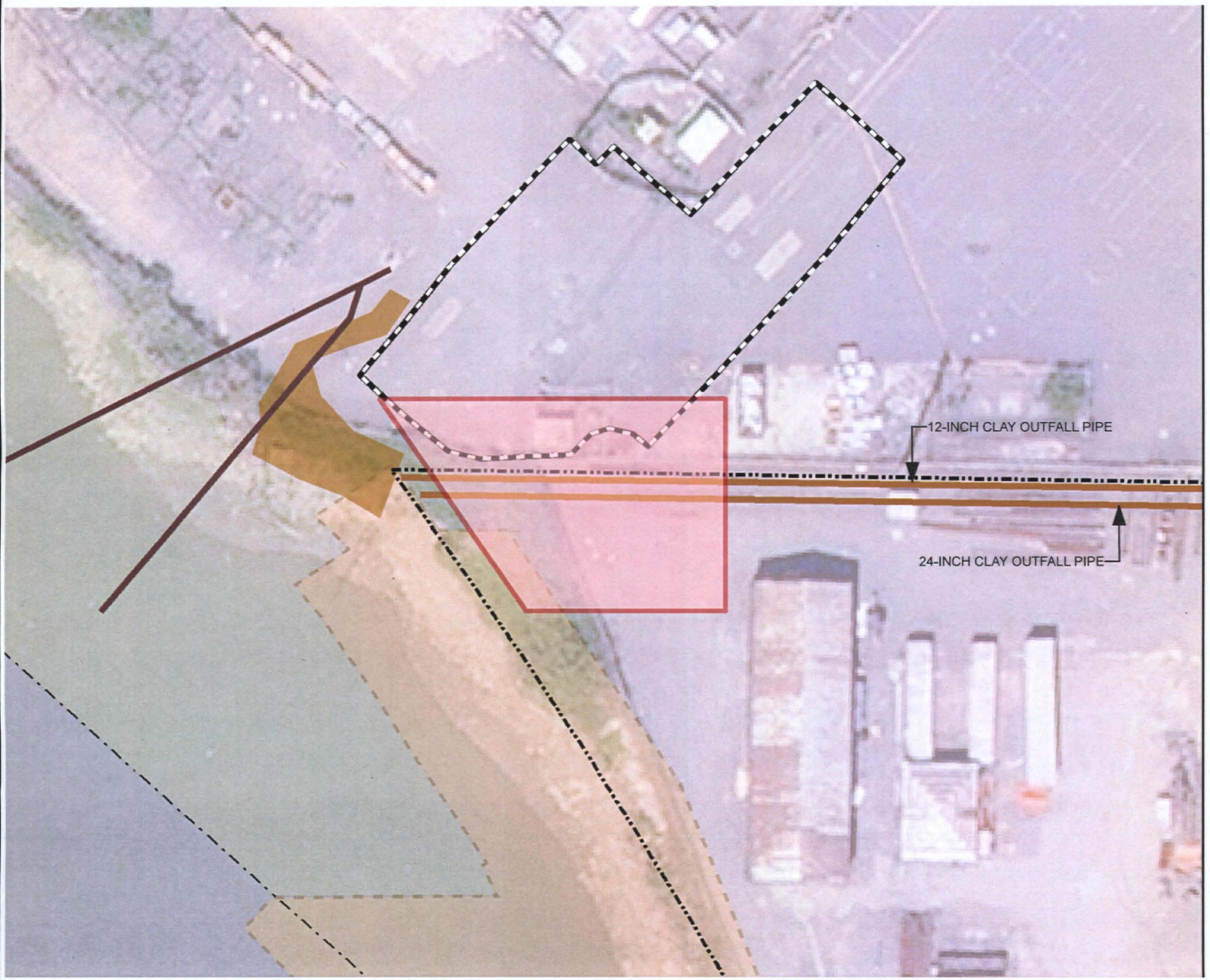

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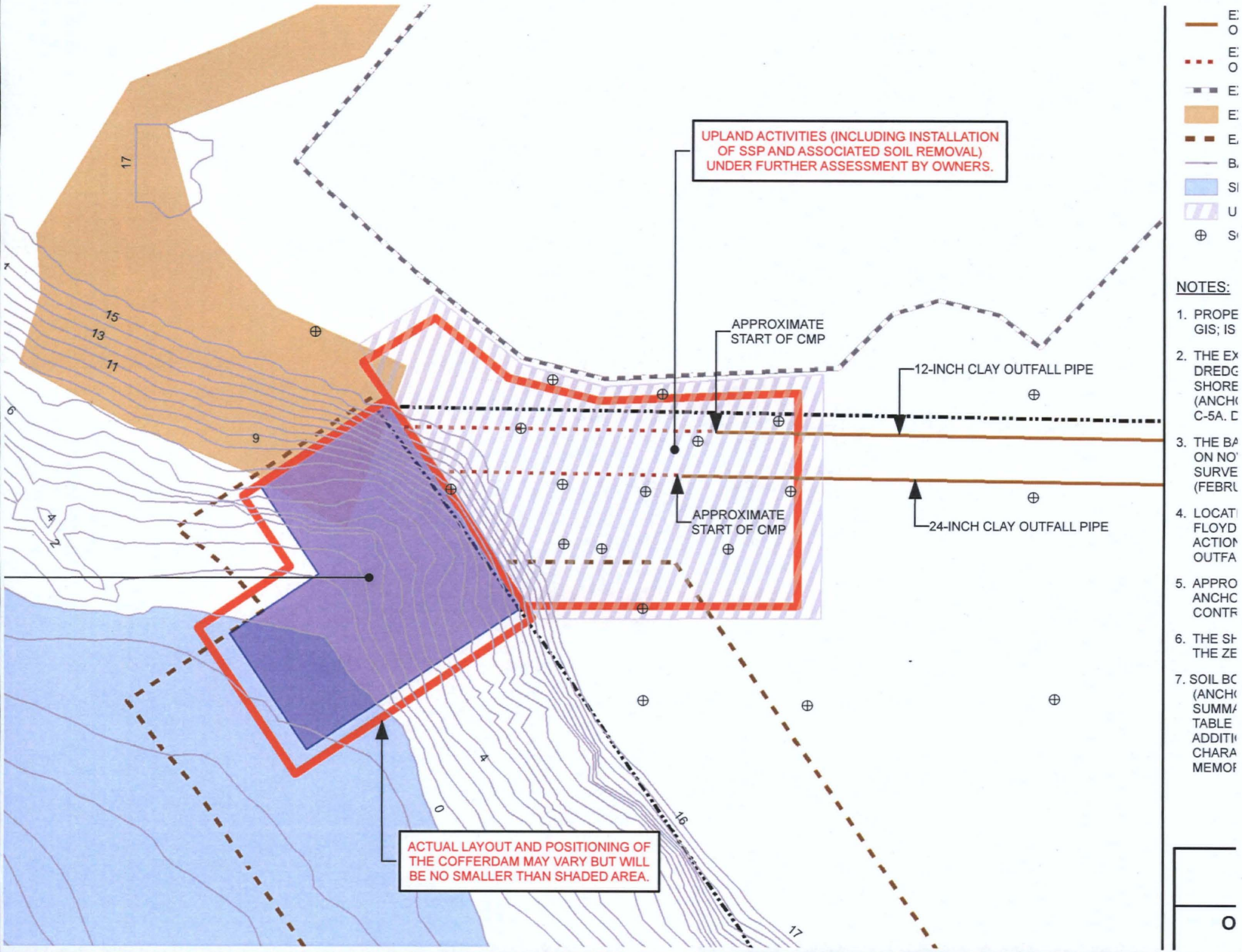
UPLAND ACTIVITIES (INCLUDING INSTALLATION OF SSP AND ASSOCIATED SOIL REMOVAL) UNDER FURTHER ASSESSMENT BY OWNERS.
APPROXIMATE START OF CMP
12-INCH CLAY OUTFALL PIPE
APPROXIMATE START OF CMP
24-INCH CLAY OUTFALL PIPE
ACTUAL LAYOUT AND POSITIONING OF THE COFFERDAM MAY VARY BUT WILL BE NO SMALLER THAN SHADED AREA.
17
15
13
11
9
6
4
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16
17
NOTES:
1. PROPE
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3. THE BA
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(FEBRU
4. LOCAT
FLOYD
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5. APPRO
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6. THE SH
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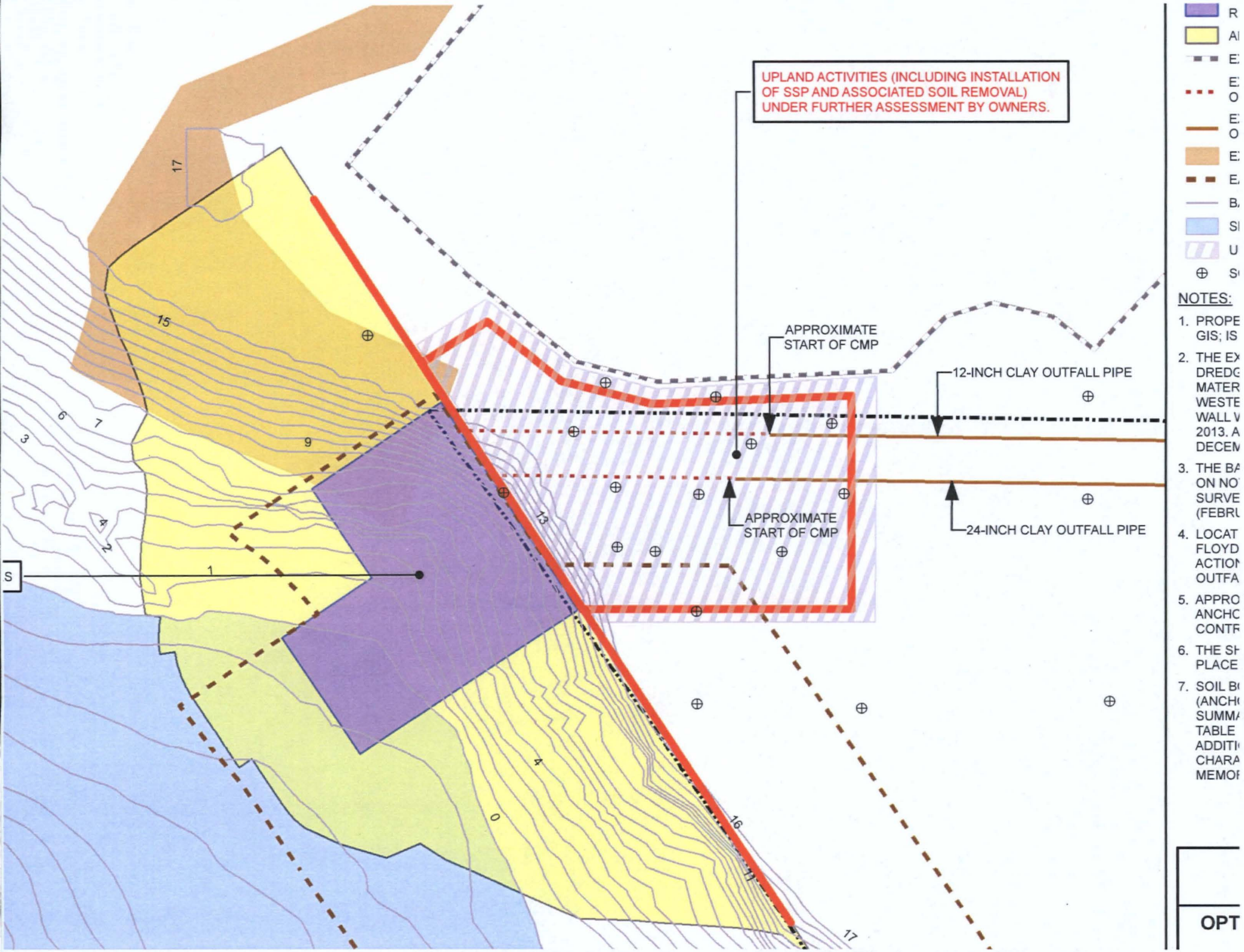
7. SOIL BC
(ANCH
SUMMA
TABLE
ADDITI
CHARA
MEMOF


UPLAND ACTIVITIES (INCLUDING INSTALLATION OF SSP AND ASSOCIATED SOIL REMOVAL) UNDER FURTHER ASSESSMENT BY OWNERS.
APPROXIMATE START OF CMP
12-INCH CLAY OUTFALL PIPE
APPROXIMATE START OF CMP
24-INCH CLAY OUTFALL PIPE
S
NOTES:
1. PROPE GIS; IS
2. THE EX DREDG MATER WESTE WALL V 2013. A DECEM
3. THE BA ON NO SURVE (FEBRU
4. LOCAT FLOYD ACTION OUTFA
5. APPRO ANCHC CONTR
6. THE SH PLACE
7. SOIL B (ANCH SUMM TABLE ADDITI CHARA MEMOI
OPT

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Appendix A

Option 1: Cofferdam Design

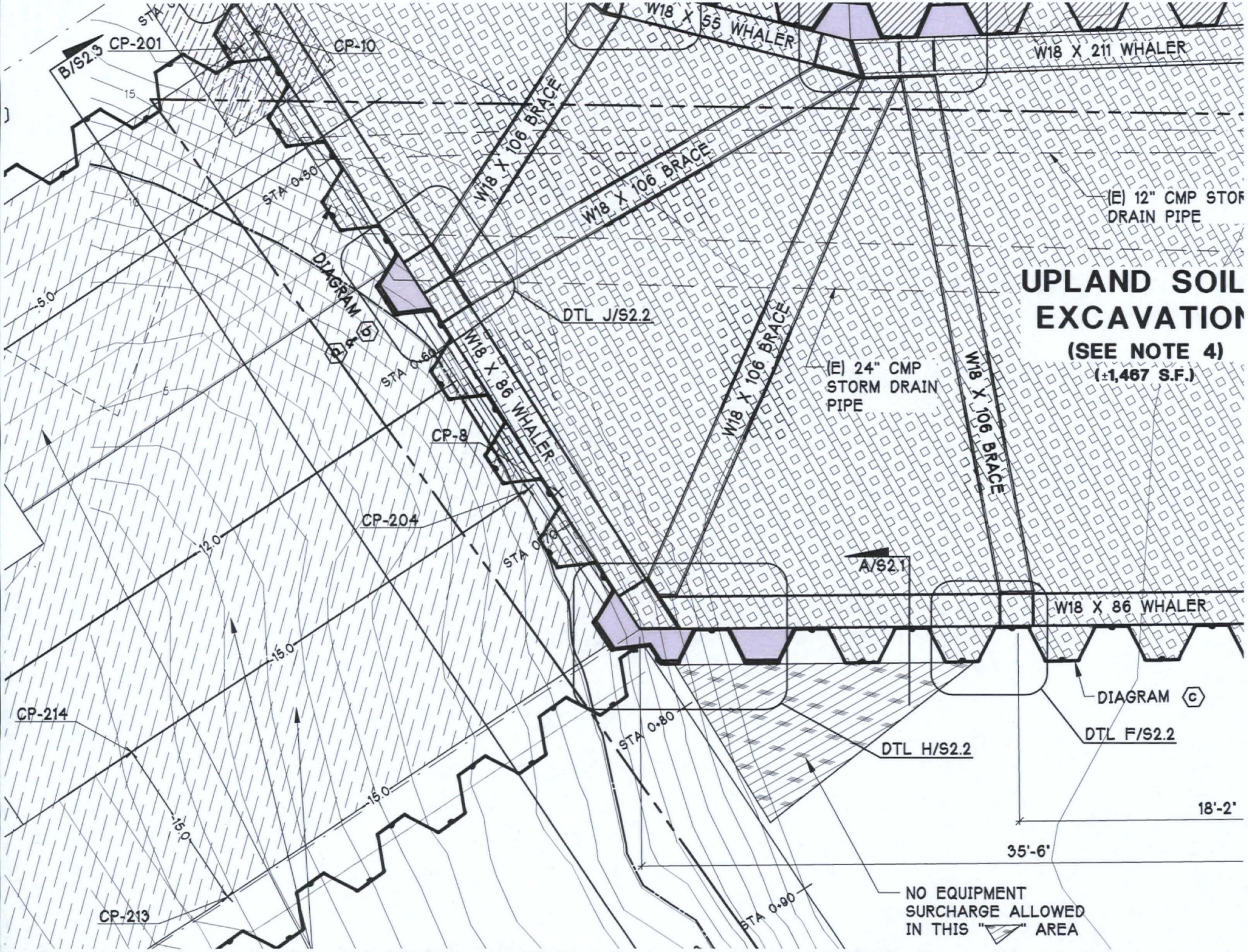
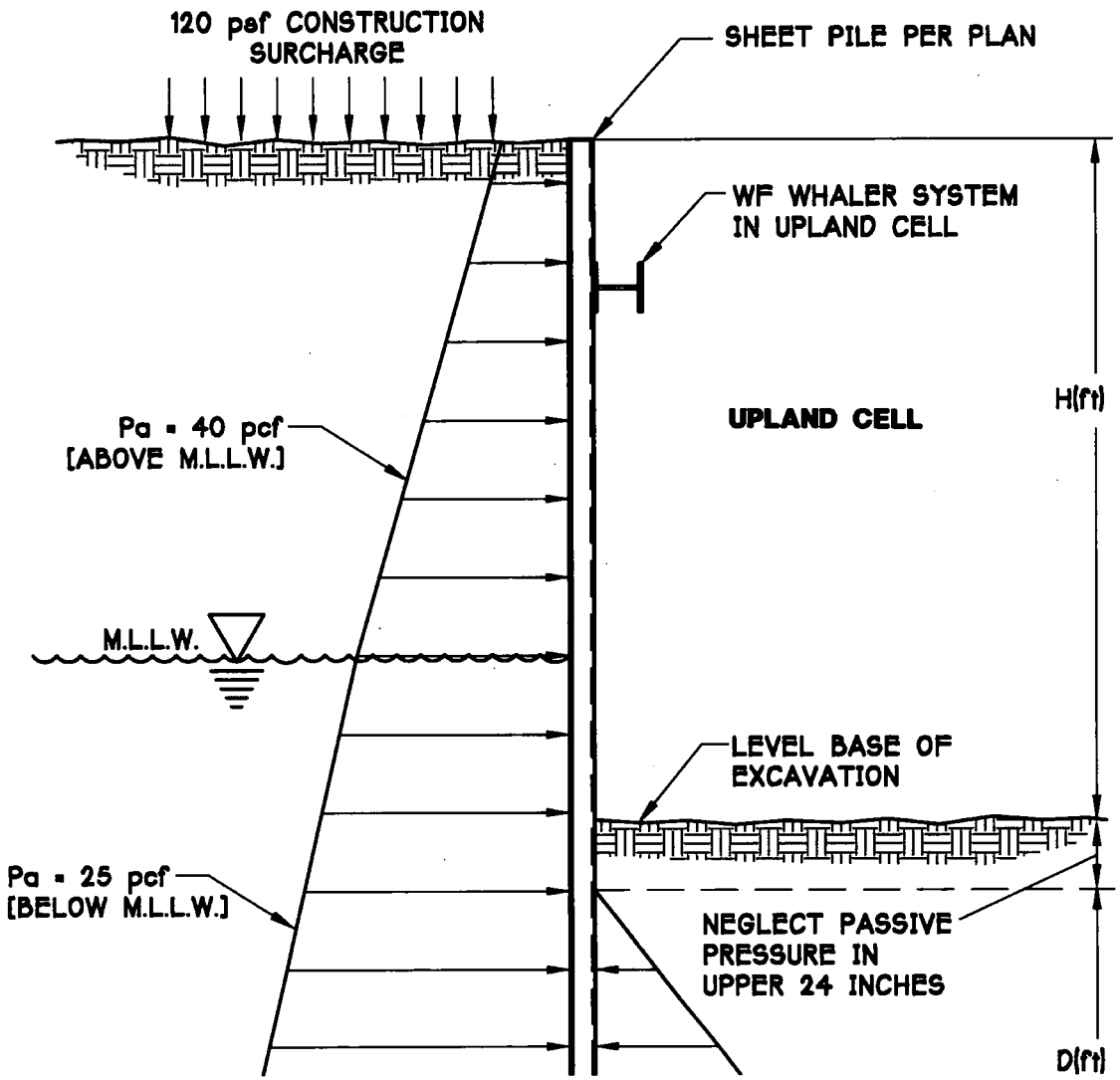

B/S2.3
CP-201
CP-10
STA
15
10
5
-5.0
-12.0
-15.0
-15.0
-15.0
CP-8
CP-204
CP-214
CP-213
STA 0+50
STA 0+60
STA 0+70
STA 0+80
STA 0+90
DIAGRAM (B)
W18 X 106 BRACE
W18 X 106 BRACE
W18 X 106 BRACE
W18 X 106 BRACE
W18 X 86 WHALER
W18 X 55 WHALER
W18 X 211 WHALER
W18 X 86 WHALER
DTL J/S2.2
(E) 24" CMP STORM DRAIN PIPE
(E) 12" CMP STOR DRAIN PIPE
A/S2.1
DIAGRAM (C)
DTL F/S2.2
DTL H/S2.2
UPLAND SOIL EXCAVATION
(SEE NOTE 4)
(±1,467 S.F.)
18'-2"
35'-6"
NO EQUIPMENT SURCHARGE ALLOWED IN THIS "" AREA

DIAGRAM (a)

JFOS IMPACTED MATERIAL EXCAVATION

CANTILEVER SHEET PILE

PRESSURE/LOADING DIAGRAM

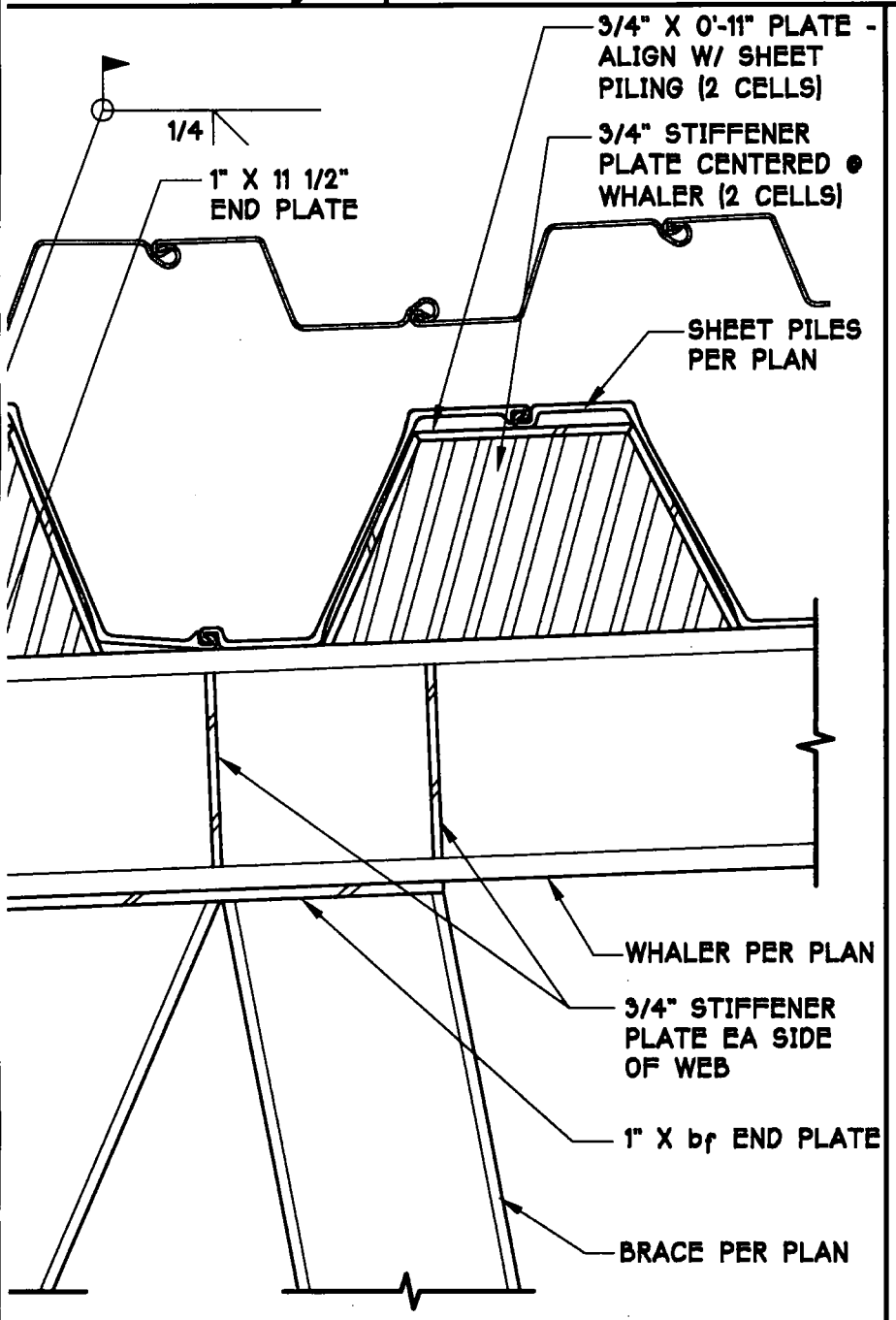


28'-0" MINIMUM

1/4" = 1'-0"

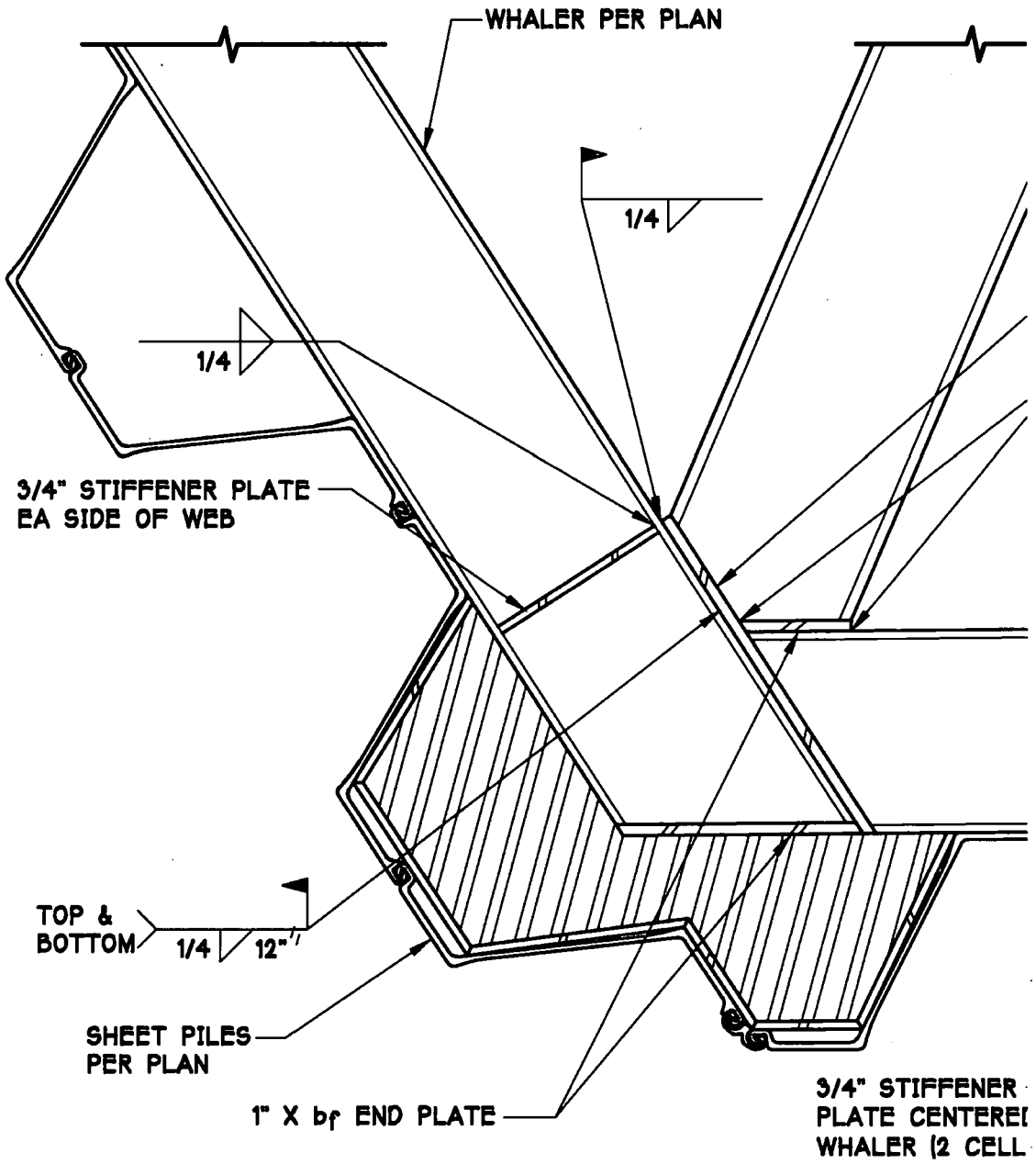
3/4" = 1'-0" | S2.2

DETAIL



3/4" = 1'-0" | S2.2

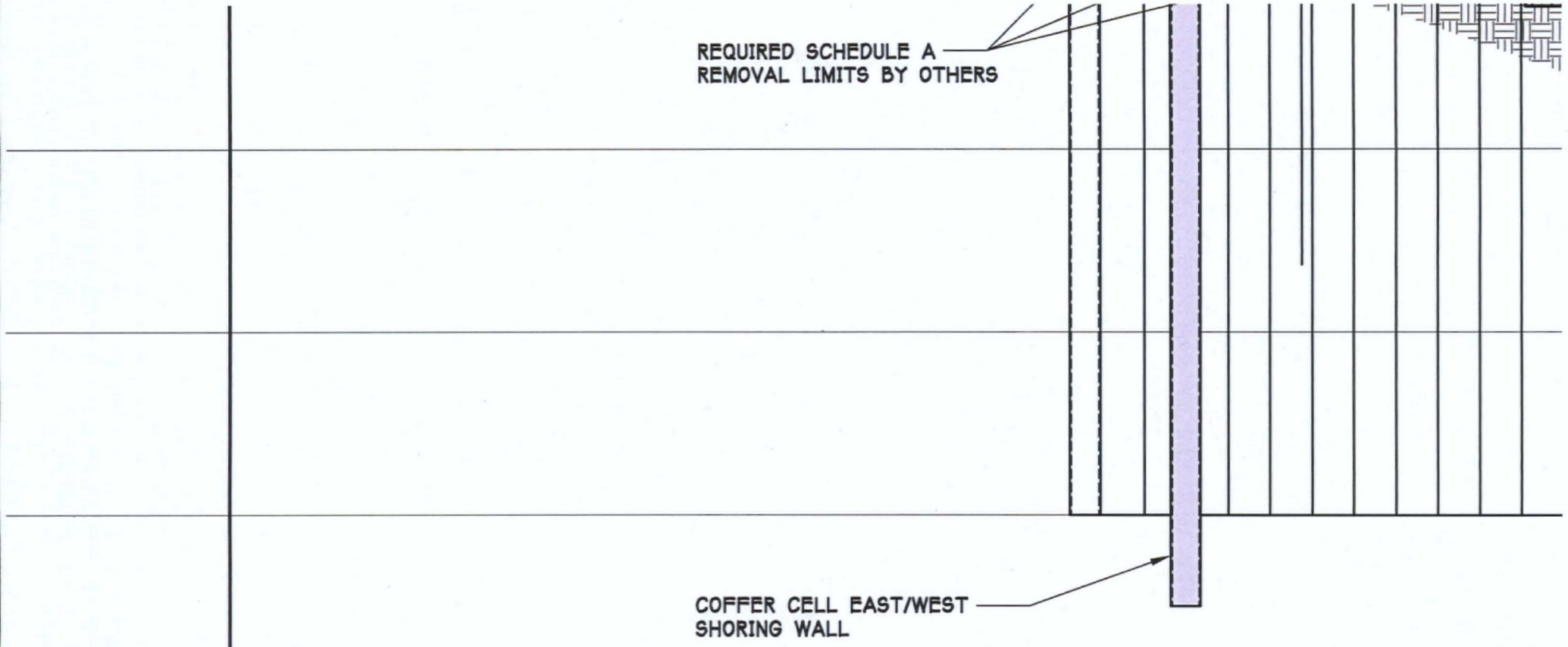
DETAIL



IL

3/4" = 1'-0" | H | S2.2

DETAIL



COFFER CELL EAST/
SHORING WALL

(VIE

ELE

1/8" = 1'-0"

B / S2.3

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Appendix B

Option 2: Shoreline Wall Design

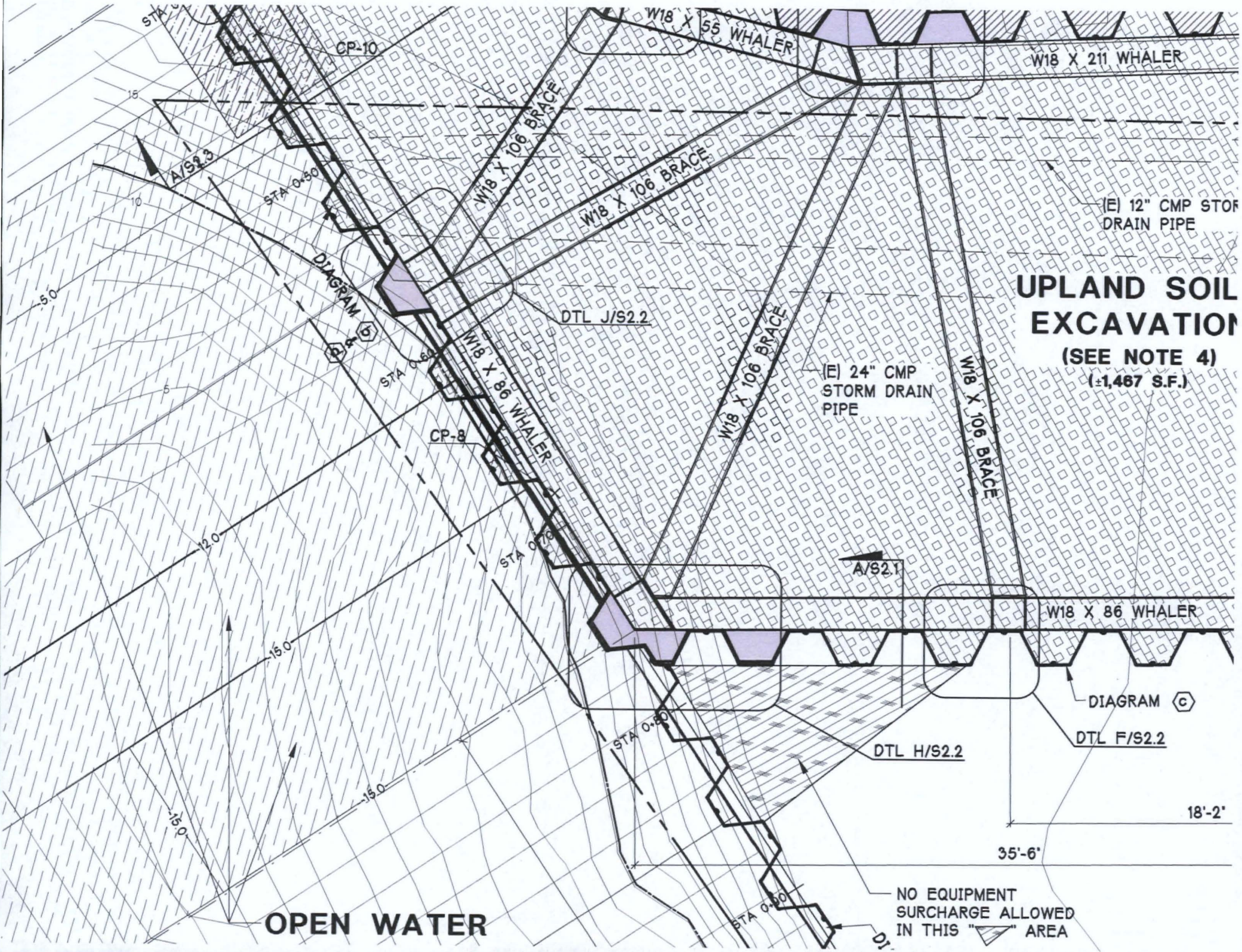
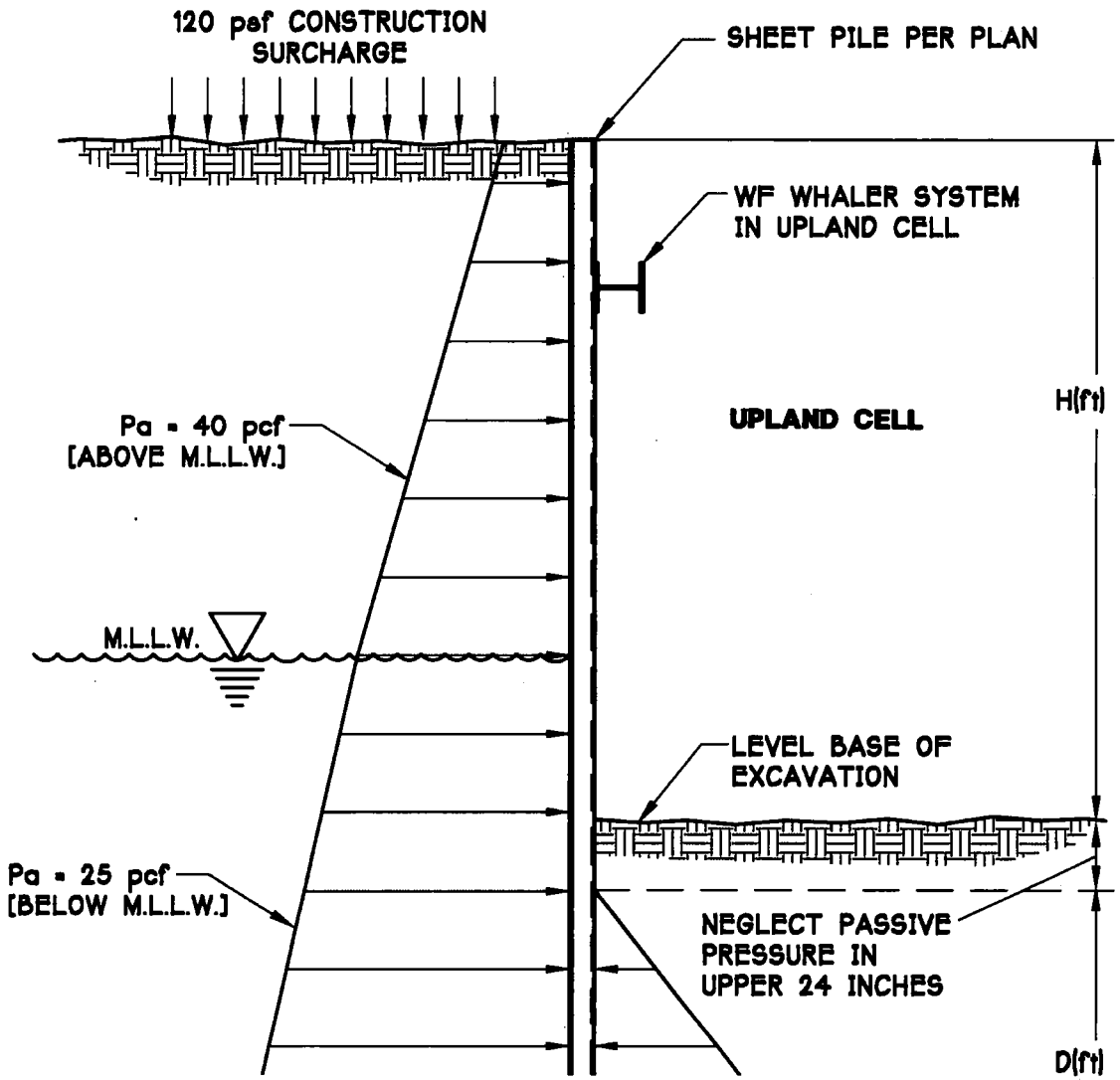

W18 X 55 WHALER
W18 X 211 WHALER
CP-10
W18 X 106 BRACE
W18 X 106 BRACE
W18 X 106 BRACE
W18 X 106 BRACE
A/S2.3
STA 0+30
DIAGRAM (D)
(E) 12" CMP STOR
DRAIN PIPE
UPLAND SOIL
EXCAVATION
(SEE NOTE 4)
(±1,467 S.F.)
DTL J/S2.2
STA 0+60
W18 X 86 WHALER
CP-8
(E) 24" CMP
STORM DRAIN
PIPE
A/S2.1
W18 X 86 WHALER
STA 0+90
DIAGRAM (C)
DTL F/S2.2
DTL H/S2.2
STA 0+30
18'-2"
35'-6"
NO EQUIPMENT
SURCHARGE ALLOWED
IN THIS "" AREA
OPEN WATER

DIAGRAM ⟨a⟩

JFOS IMPACTED MATERIAL EXCAVATION

CANTILEVER SHEET PILE

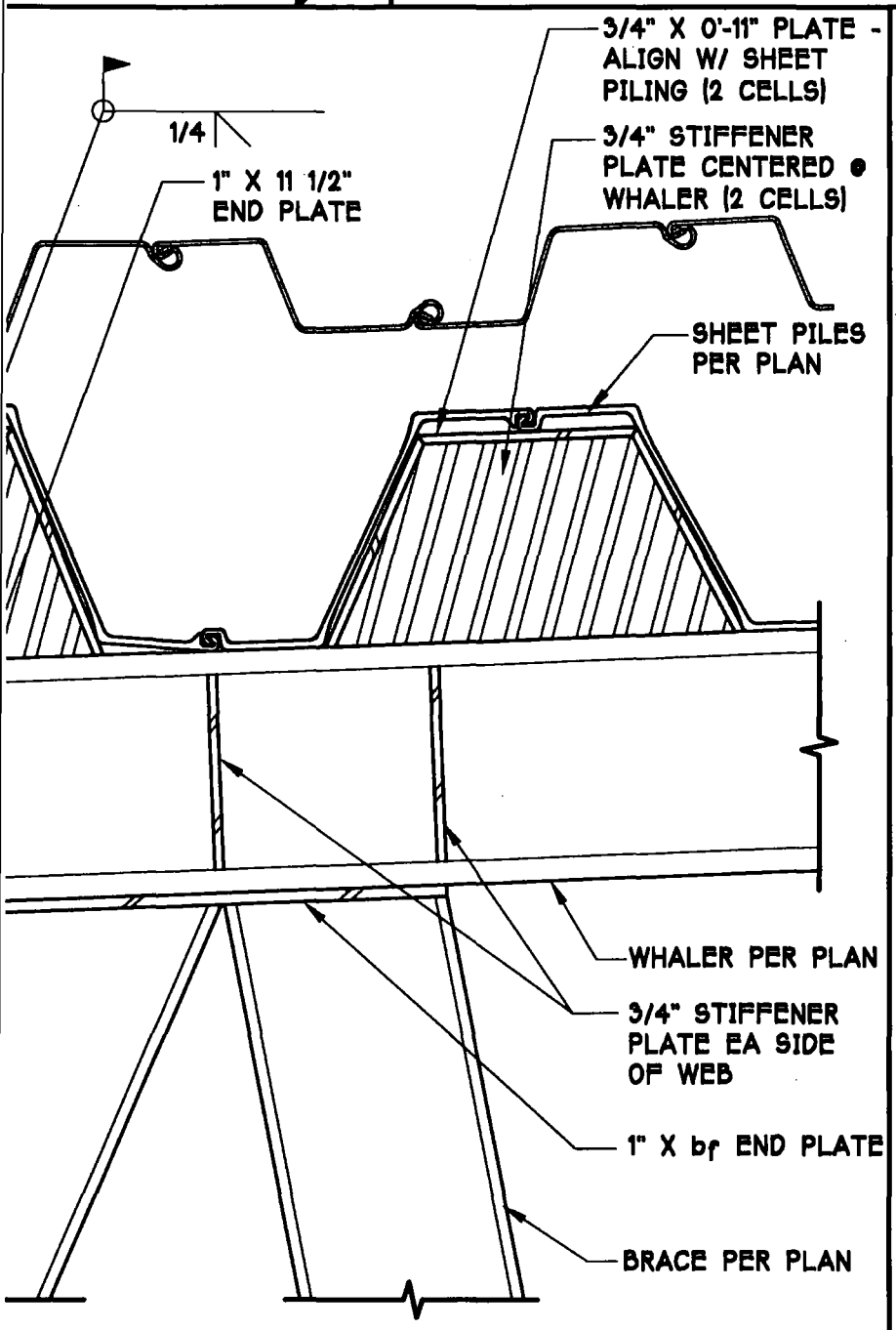
PRESSURE/LOADING DIAGRAM



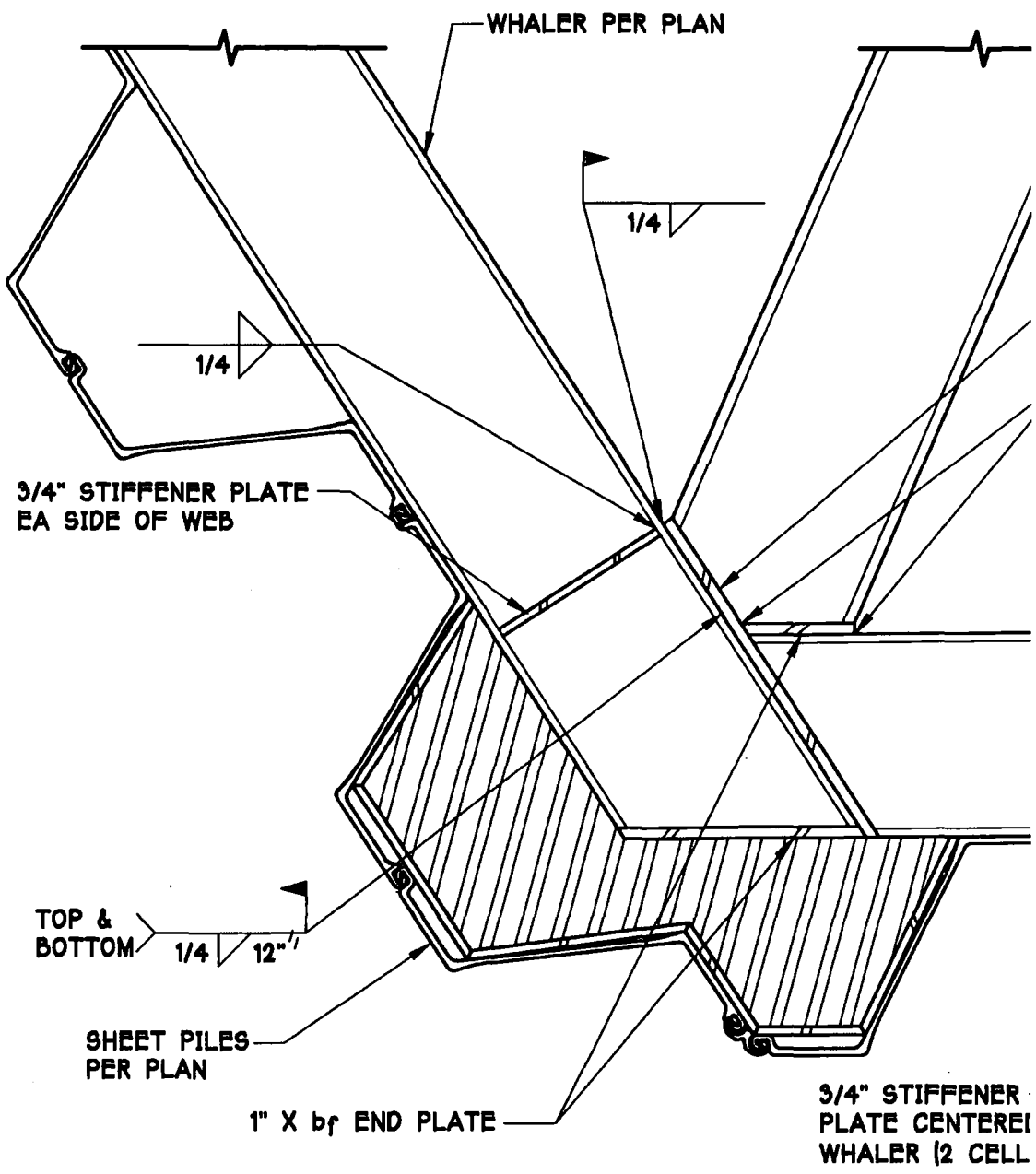
28'-0" MINIMUM

1/4" = 1'-0"

3/4" = 1'-0" | S2.2 DETAIL

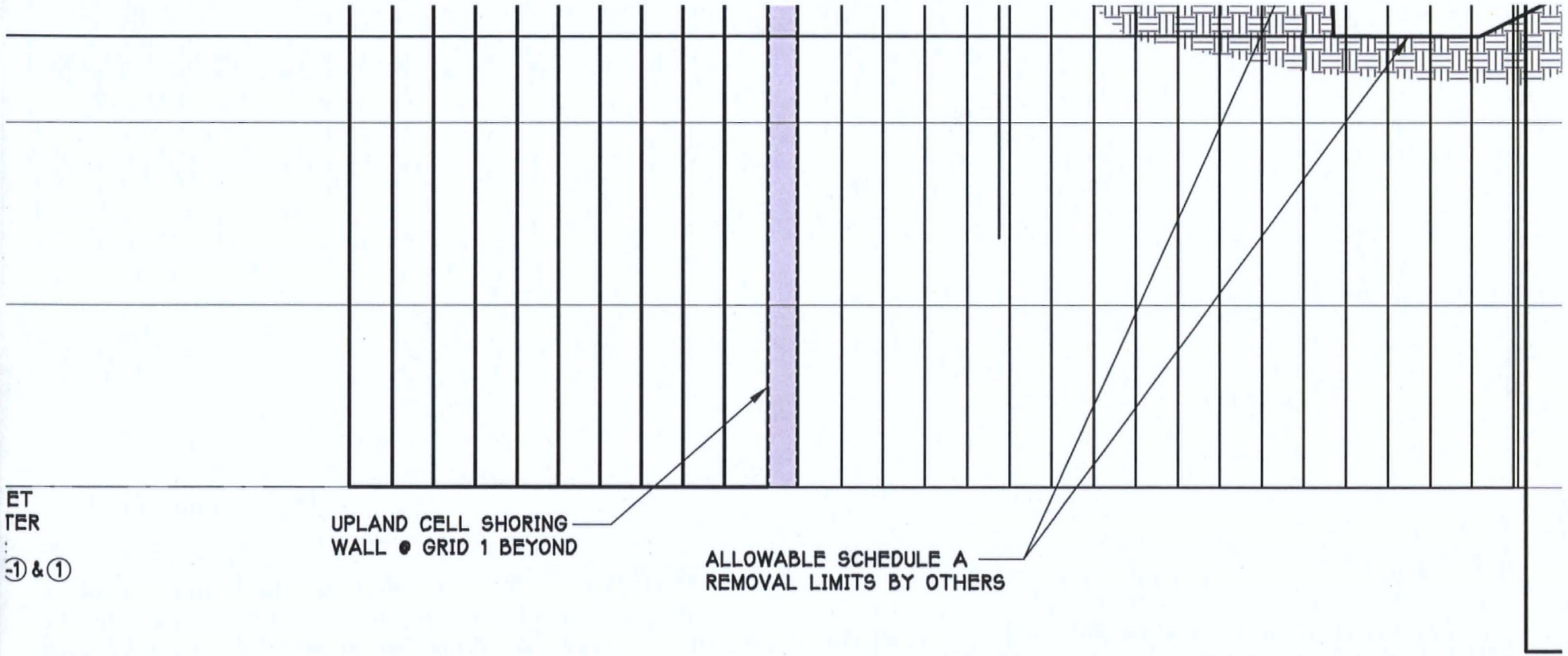


3/4" = 1'-0" | S2.2 DET



IL

3/4" = 1'-0" | H S2.2 DETAIL



ET
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-① & ①

(VIEWING EAST)

ELEVATION

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Appendix C

List of Specifications

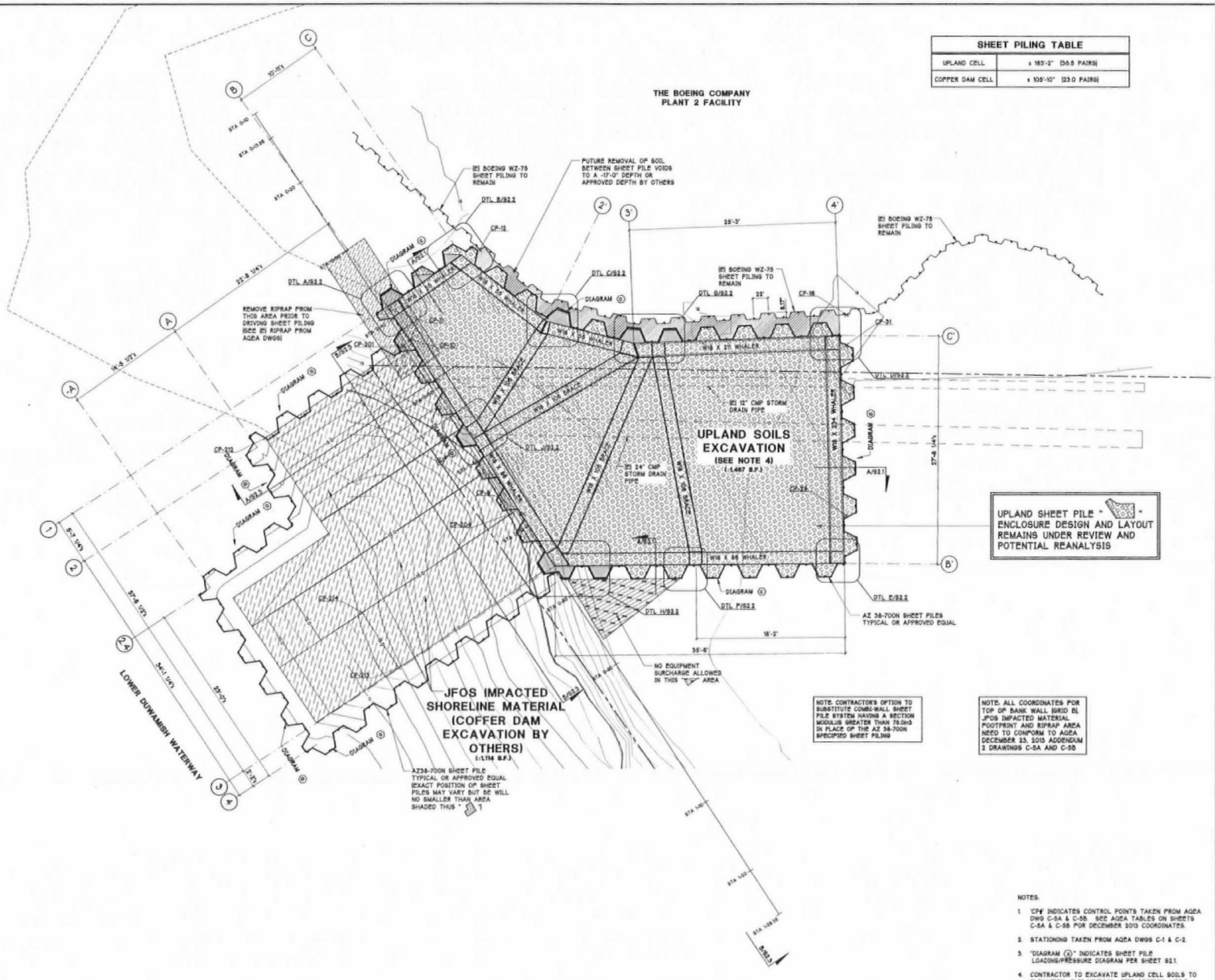
PROCUREMENT AND CONTRACTING REQUIREMENTS

Division 00 – Procurement and Contracting Requirements

TECHNICAL SPECIFICATIONS

Division 01 – General Requirements

END OF SECTION



REVISIONS
DATE | DESCRIPTION

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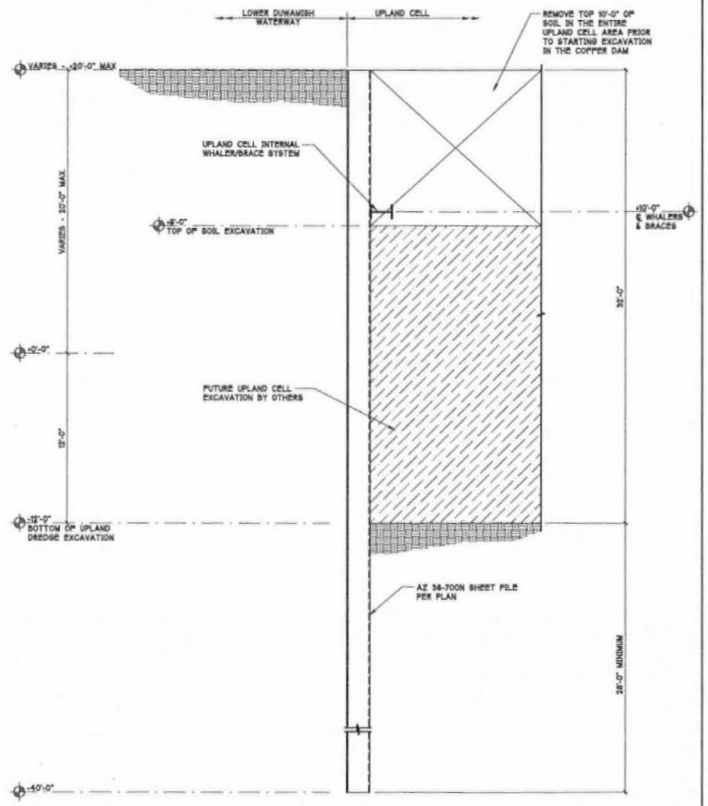
B & T DESIGN & ENGINEERING, INC.
BENDLY ENGINEERING

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA
PROJECT TITLE

OPTION 1
SHORING PLAN
SHEET TITLE

PROJECT	13092.1
DATE	01/09/14
DRAWN	NH
CHKD.	JT

SHEET :
S1.1
OF



A S2.1

SECTION

1/4" = 1'-0"

GENERAL STRUCTURAL SHORING SPECIFICATIONS

GENERAL NOTE
CODE: INTERNATIONAL BUILDING CODE — 2012 EDITION
ALL ASTM'S CALLED OUT ARE TO BE THE LATEST EDITION

FOUNDATION
FOUNDATION DESIGN WAS BASED UPON SOILS REPORT NO. J613447 BY GEOTECH CONSULTANTS, INC. DATED DECEMBER 6, 2013. THE FOLLOWING VALUES WERE USED:

LATERAL EARTH PRESSURE: ..... 40 PCF EQUIVALENT FLUID PRESSURE (ACTIVE-UNRESTRAINED)
..... 55 PCF EQUIVALENT FLUID PRESSURE (ACTIVE-UNRESTRAINED) BELOW WATER LEVEL
..... 120 PSF (EQUIPMENT SURCHARGE)
..... 175 PCF EQUIVALENT FLUID PRESSURE (PASSIVE - INCLUDES 1.5 FACTOR OF SAFETY)

ALL SITE PREPARATION AND GRADING SHALL BE DONE IN ACCORDANCE WITH SOILS REPORT.

STRUCTURAL STEEL
ALL WORK IN ACCORDANCE WITH "AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", AND THE "CODE OF STANDARD PRACTICE", ALLOWABLE STRESS DESIGN, 9th ADDITION.
STRUCTURAL STEEL & STEEL PLATES TO CONFORM WITH :
ASTM A-572 (Fy = 50,000 PSI)
STRUCTURAL STEEL SHEET PILING TO CONFORM WITH :
ASTM A-572 (Fy = 50,000 PSI)
ALL WELDING TO CONFORM WITH AWS D1.1 "CODE FOR WELDING IN BUILDING CONSTRUCTION". WELDS NOT SPECIFIED SHALL BE 1/4" CONTINUOUS FILLET MINIMUM. ALL WELDS BY CERTIFIED WELDERS. USE FRESH 70XX ELECTRODES.

SPECIAL CONDITIONS
CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD AND SHALL PROVIDE ADEQUATE BRACING OF ALL STRUCTURAL MEMBERS DURING THE SHORING ERECTION. CONTRACTOR SHALL NOTIFY B & T DESIGN AND ENGINEERING, INC. OF ALL FIELD CHANGES PRIOR TO INSTALLATION OF SHORING.

EXCAVATION & SHORING NOTES
1. PLACE STEEL SHEET PILES PER PLANS.
2. STEEL PILES ARE TO EXTEND BELOW FINISH GRADE THE DEPTH OF EXCAVATION PLUS THE DEPTH OF EMBEDMENT AS SHOWN ON SECTIONS.
3. PLACE WHALERS AND BRACES IN PLACE PRIOR TO EXCAVATING BELOW WHALER ELEVATION.
4. SHORING MEMBERS ARE DESIGNED FOR LATERAL LOADS IMPOSED BY SOIL AS DESIGNATED BY ACTIVE PRESSURES SPECIFIED BY LOADING DIAGRAMS.
5. ALL STEEL TO BE PER SPECIFICATIONS UNDER "STRUCTURAL STEEL" NOTES ABOVE.

WIDE FLANGE PILE, WHALER AND BRACE TABLE

MARK	d (in.)	bf (in.)	S^{in3}	tf (in.)	TYPE
W18 X 50	18"	7 1/2"	88.9	9/16"	WHALER
W18 X 106	18 3/4"	11 1/4"	204	15/16"	BRACE/WHALER
W18 X 130	19 1/4"	11 1/8"	256	1 3/16"	WHALER
W18 X 158	19 3/4"	11 1/4"	310	1 7/16"	WHALER

NOTES:
1. ANY WHALER, BRACE OR PILE SIZE WITH A LARGER Sin3 (SECTION MODULUS) MAY BE USED IN PLACE OF THE REFERENCED WIDE FLANGE WHALER AND BRACE CALL OUT.

GENERAL NOTES

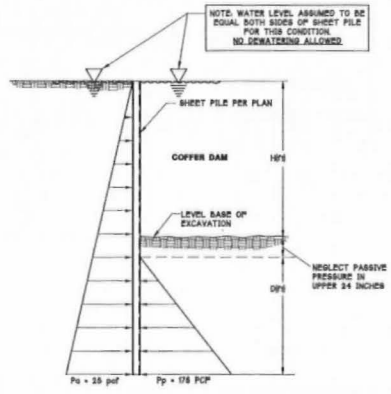


DIAGRAM (a)

JFOS IMPACTED MATERIAL EXCAVATION
CANTILEVER SHEET PILE
PRESSURE/LOADING DIAGRAM

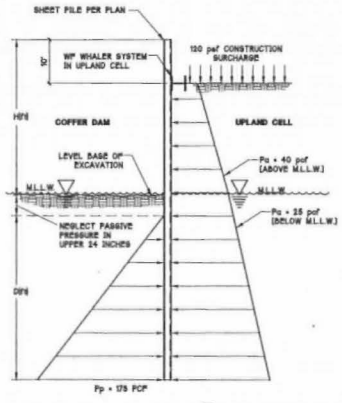


DIAGRAM (b)

JFOS IMPACTED MATERIAL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

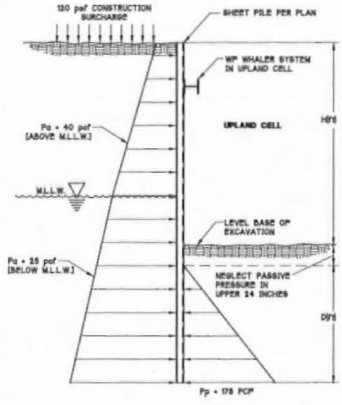


DIAGRAM (c)

UPLAND SOIL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

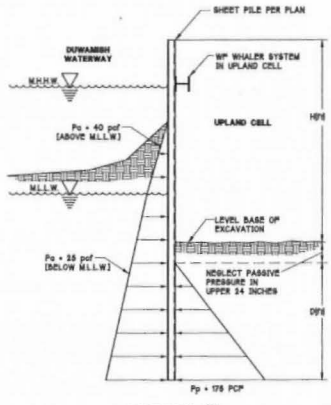


DIAGRAM (d)

UPLAND SOIL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

SHEET PILE PRESSURE/LOADING DIAGRAMS

SHEET PILE PRESSURE/LOADING DIAGRAM NOTES:
1. PASSIVE PRESSURE ASSUMED TO ACT OVER SHEET PILE WIDTH AND INCLUDES FACTOR-OF-SAFETY 1.5.
2. M.H.H.W. = MEAN HIGH HIGH WATER LEVEL IN THE DUWAMISH WATERWAY.
3. M.L.L.W. = MEAN LOW LOW WATER LEVEL IN THE DUWAMISH WATERWAY.

SHEET PILE LOADING/PRESSURE DIAGRAM NOTES

REVISIONS
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B & T DESIGN & ENGINEERING, INC.
DESIGN & ENGINEERING

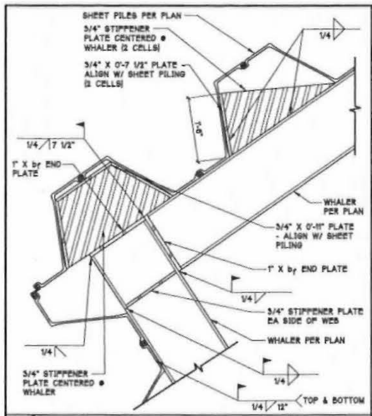
JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA
PROJECT TITLE

OPTION 1
DETAILS & NOTES
SHEET TITLE

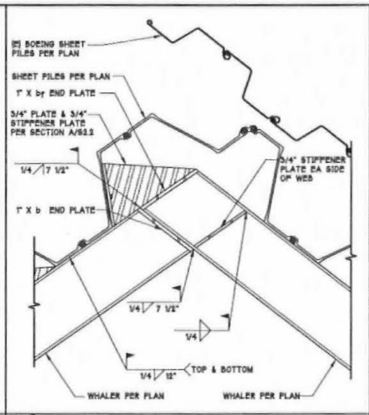
PROJECT	130921
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :
S2.1 1
OF

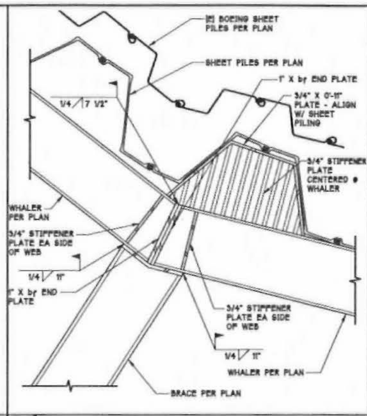
130921-S2.1 01/10/14


SHEET PILES PER PLAN
3/4" STIFFENER PLATE CENTERED @ WHALER (2 CELLS)
3/4" X 0'-7 1/2" PLATE - ALIGN W/ SHEET PILING (2 CELLS)
1/4
1/4 7 1/2"
1" X by END PLATE
WHALER PER PLAN
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING
1" X by END PLATE
3/4" STIFFENER PLATE EA SIDE OF WEB
WHALER PER PLAN
3/4" STIFFENER PLATE CENTERED @ WHALER
1/4 12" TOP & BOTTOM

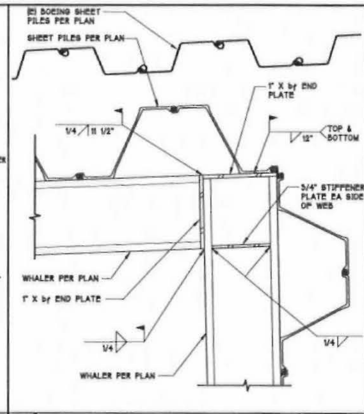
A S2.2 **DETAIL** 3/4" = 1'-0"



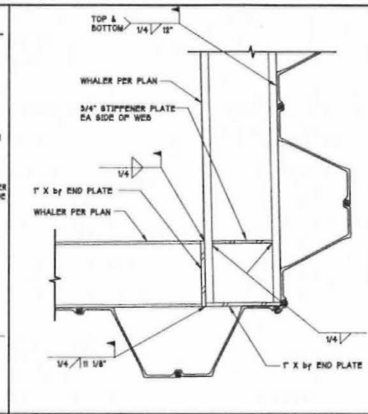
B S2.2 **DETAIL** 3/4" = 1'-0"


(E) BOEING SHEET PILES PER PLAN
SHEET PILES PER PLAN
1" X by END PLATE
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING
1/4 7 1/2"
3/4" STIFFENER PLATE CENTERED @ WHALER
WHALER PER PLAN
3/4" STIFFENER PLATE EA SIDE OF WEB
1/4 11"
1" X by END PLATE
3/4" STIFFENER PLATE EA SIDE OF WEB
1/4 11"
WHALER PER PLAN
BRACE PER PLAN

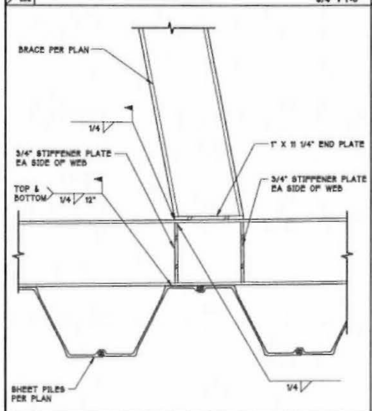
C S2.2 **DETAIL** 3/4" = 1'-0"



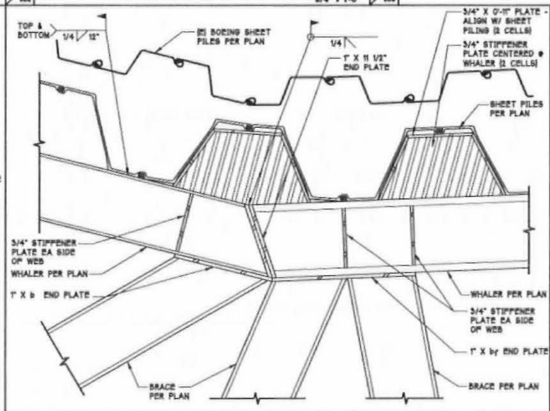
D S2.2 **DETAIL** 3/4" = 1'-0"



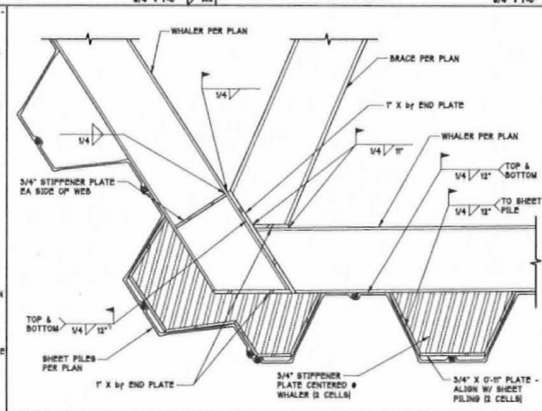
E S2.2 **DETAIL** 3/4" = 1'-0"



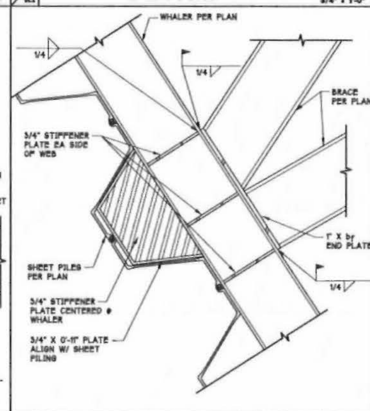
F S2.2 **DETAIL** 3/4" = 1'-0"


TOP & BOTTOM 1/4 12"
(E) BOEING SHEET PILES PER PLAN
1/4
1" X 11 1/2" END PLATE
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING (2 CELLS)
3/4" STIFFENER PLATE CENTERED @ WHALER (2 CELLS)
SHEET PILES PER PLAN
3/4" STIFFENER PLATE EA SIDE OF WEB
WHALER PER PLAN
1" X b END PLATE
WHALER PER PLAN
3/4" STIFFENER PLATE EA SIDE OF WEB
1" X by END PLATE
BRACE PER PLAN
BRACE PER PLAN

G S2.2 **DETAIL** 3/4" = 1'-0"


WHALER PER PLAN
BRACE PER PLAN
1/4
1" X by END PLATE
1/4
WHALER PER PLAN
1/4 11"
1/4 12" TOP & BOTTOM
1/4 12" TO SHEET PILE
3/4" STIFFENER PLATE EA SIDE OF WEB
TOP & BOTTOM 1/4 12"
SHEET PILES PER PLAN
1" X by END PLATE
3/4" STIFFENER PLATE CENTERED @ WHALER (2 CELLS)
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING (2 CELLS)

H S2.2 **DETAIL** 3/4" = 1'-0"



J S2.2 **DETAIL** 3/4" = 1'-0"

REVISIONS

DATE	DESCRIPTION

B&T DESIGN & ENGINEERING

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA

PROJECT TITLE

OPTION 1 DETAILS

SHEET TITLE

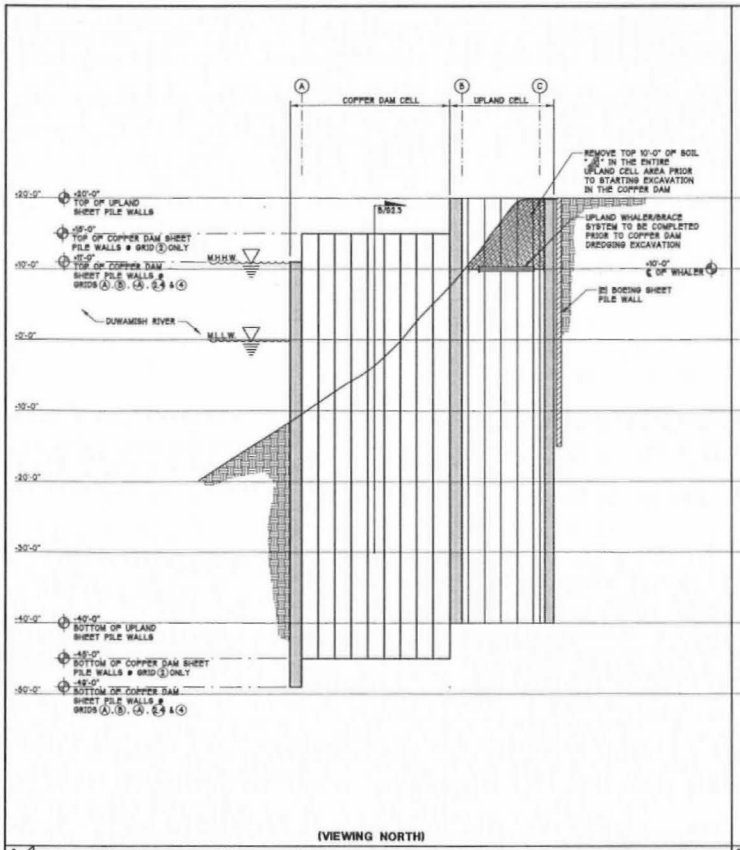
PROJECT	13092.1
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET:

S2.2.1

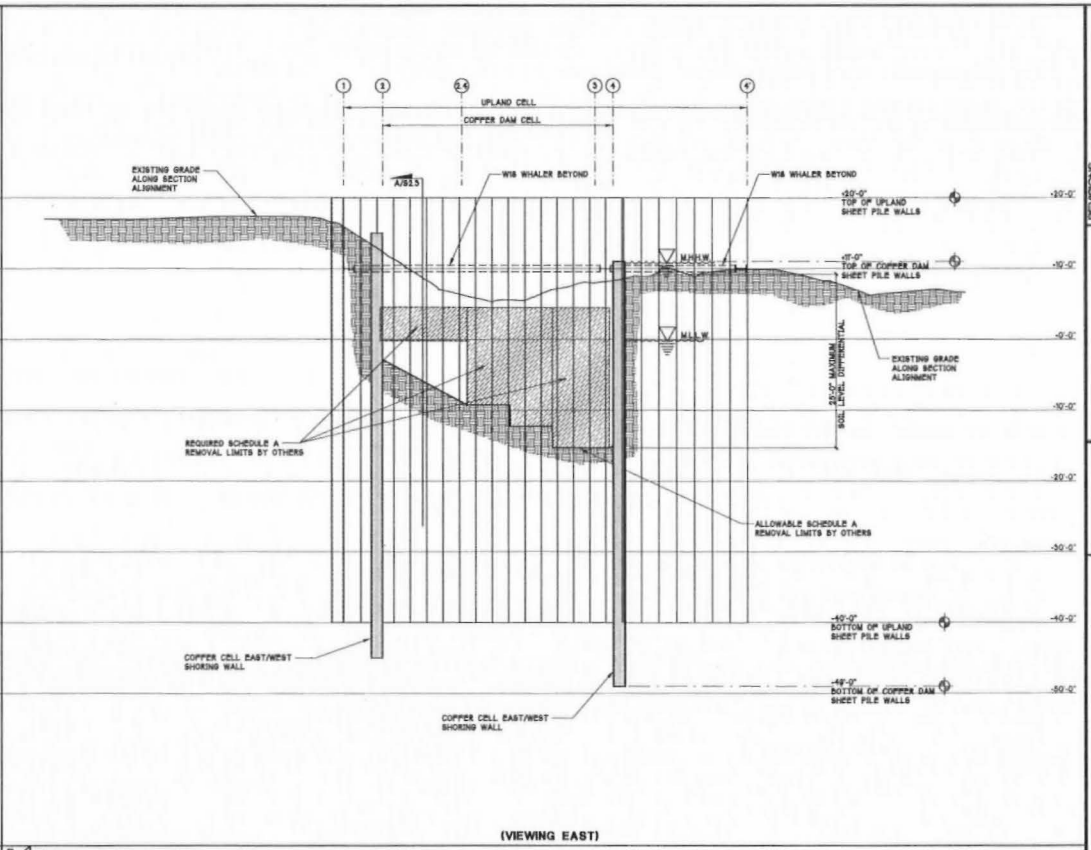
OF

13092-S2_1 01/10/14



(VIEWING NORTH)

A/S2.3 **ELEVATION** 1/8" = 1'-0"



(VIEWING EAST)

B/S2.3 **ELEVATION** 1/8" = 1'-0"

REVISIONS	
DATE	DESCRIPTION

B&T DESIGN & ENGINEERING, INC.
B&T DESIGN & ENGINEERING

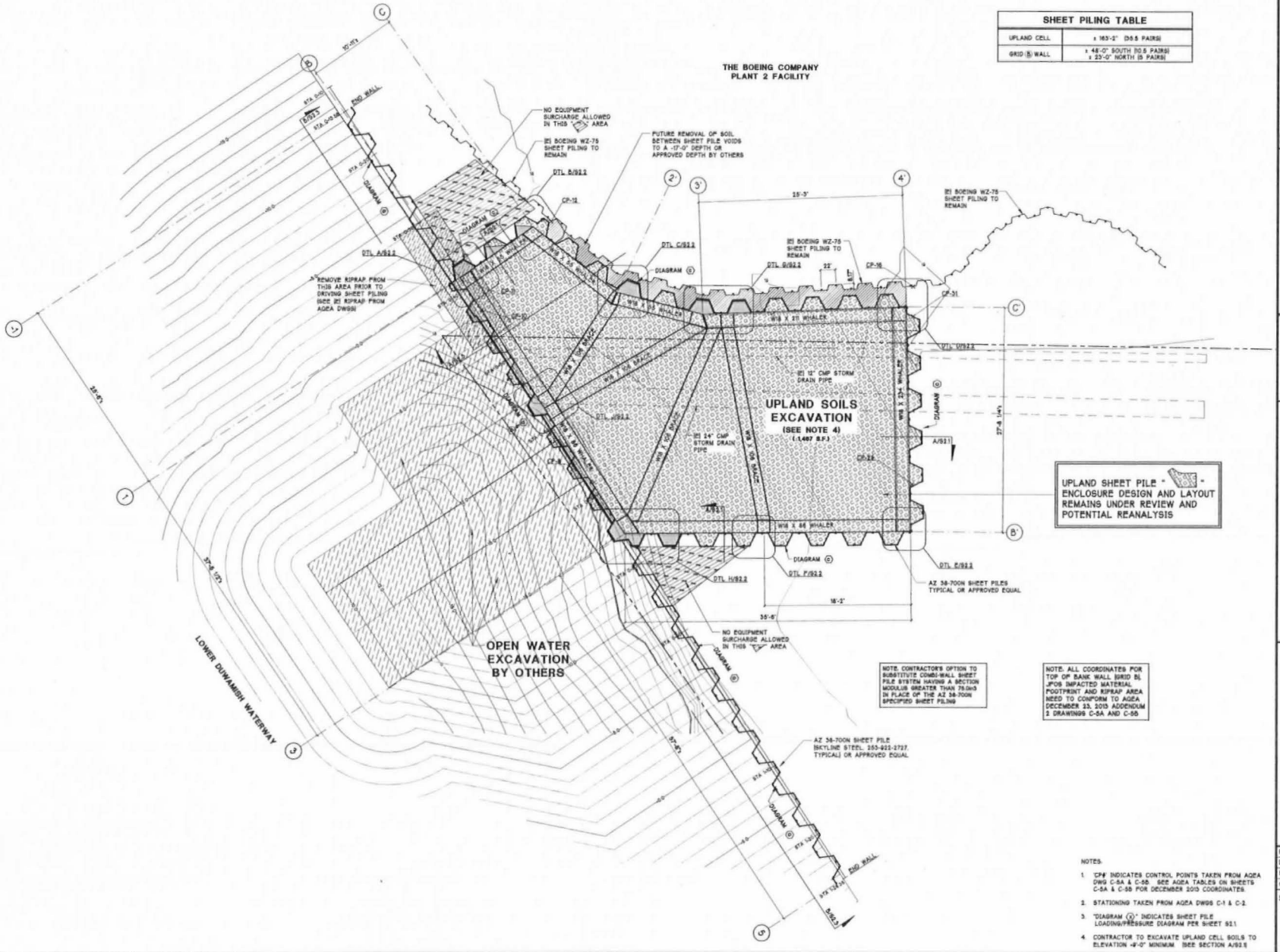
JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA
PROJECT TITLE

OPTION 1
ELEVATIONS
SHEET TITLE

PROJECT	130921
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :
S2.3 1
OF

130921-S2.1 01/10/14



REVISIONS
DATE | DESCRIPTION

B&T DESIGN & ENGINEERING, INC.
B&T DESIGN & ENGINEERING

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA

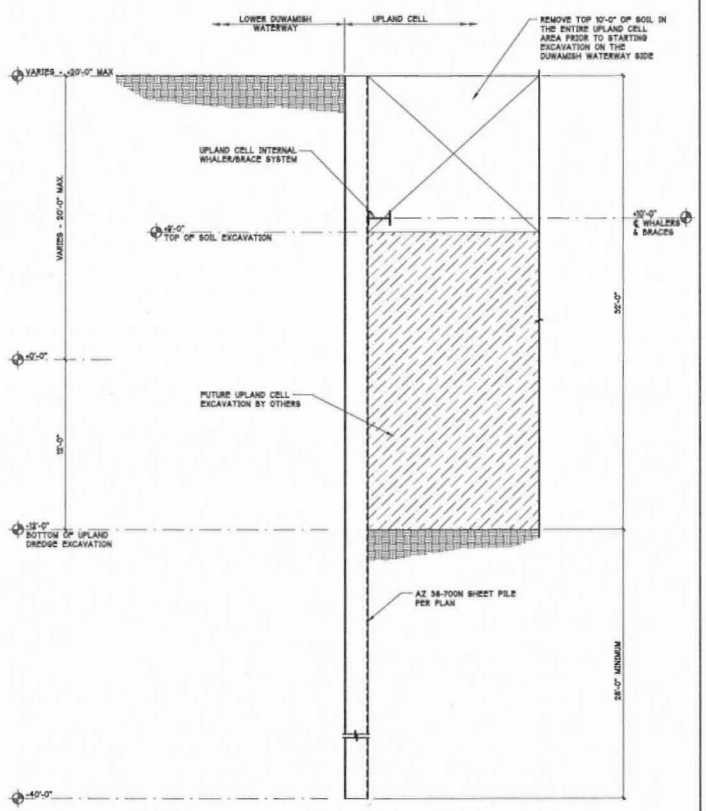
PROJECT TITLE

OPTION 2
SHORING PLAN

SHEET TITLE

PROJECT	13092.1
DATE	01/09/14
DRAWN	NH
CHKD.	JT

SHEET :
S1.1₂
OF



A
S2.1

SECTION

1/4" = 1'-0"

GENERAL STRUCTURAL SHORING SPECIFICATIONS

GENERAL NOTE
CODE: INTERNATIONAL BUILDING CODE — 2012 EDITION
ALL ASTM'S CALLED OUT ARE TO BE THE LATEST EDITION

FOUNDATION
FOUNDATION DESIGN WAS BASED UPON SOILS REPORT NO. JN13447 BY GEOTECH CONSULTANTS, INC. DATED DECEMBER 6, 2013. THE FOLLOWING VALUES WERE USED:

LATERAL EARTH PRESSURE: ..... 40 PCF EQUIVALENT FLUID PRESSURE (ACTIVE-UNRESTRAINED)
..... 25 PCF EQUIVALENT FLUID PRESSURE (ACTIVE-UNRESTRAINED) BELOW WATER LEVEL
..... 120 PSF (EQUIPMENT SURCHARGE)
..... 175 PCF EQUIVALENT FLUID PRESSURE (PASSIVE - INCLUDES 1.5 FACTOR OF SAFETY)

ALL SITE PREPARATION AND GRADING SHALL BE DONE IN ACCORDANCE WITH SOILS REPORT.

STRUCTURAL STEEL
ALL WORK IN ACCORDANCE WITH "AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", AND THE "CODE OF STANDARD PRACTICE", ALLOWABLE STRESS DESIGN, 9th ADDITION.
STRUCTURAL STEEL & STEEL PLATES TO CONFORM WITH :
ASTM A-572 (Fy = 50,000 PSI)
STRUCTURAL STEEL SHEET PILING TO CONFORM WITH :
ASTM A-572 (Fy = 50,000 PSI)
ALL WELDING TO CONFORM WITH AWS D1.1 "CODE FOR WELDING IN BUILDING CONSTRUCTION". WELDS NOT SPECIFIED SHALL BE 1/4" CONTINUOUS FILLET MINIMUM. ALL WELDS BY CERTIFIED WELDERS. USE FRESH 7000 ELECTRODES.

SPECIAL CONDITIONS
CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD AND SHALL PROVIDE ADEQUATE BRACING OF ALL STRUCTURAL MEMBERS DURING THE SHORING ERECTION. CONTRACTOR SHALL NOTIFY B & T DESIGN AND ENGINEERING, INC. OF ALL FIELD CHANGES PRIOR TO INSTALLATION OF SHORING.

EXCAVATION & SHORING NOTES:
1. PLACE STEEL SHEET PILES PER PLANS.
2. STEEL PILES ARE TO EXTEND BELOW FINISH GRADE THE DEPTH OF EXCAVATION PLUS THE DEPTH OF EMBEDMENT AS SHOWN ON SECTIONS.
3. PLACE WHALERS AND BRACES IN PLACE PRIOR TO EXCAVATING BELOW WHALER ELEVATION.
4. SHORING MEMBERS ARE DESIGNED FOR LATERAL LOADS IMPOSED BY SOIL AS DESIGNATED BY ACTIVE PRESSURES SPECIFIED BY LOADING DIAGRAMS.
5. ALL STEEL TO BE PER SPECIFICATIONS UNDER "STRUCTURAL STEEL" NOTES ABOVE.

WIDE FLANGE PILE, WHALER AND BRACE TABLE					
MARK	d (in.)	b_f (in.)	S^{b3}	t_f (in.)	TYPE
W18 X 50	18"	7 1/2"	88.9	9/16"	WHALER
W18 X 106	18 3/4"	11 1/4"	204	15/16"	BRACE/WHALER
W18 X 130	19 1/4"	11 1/8"	256	1 3/16"	WHALER
W18 X 158	19 3/4"	11 1/4"	310	1 7/16"	WHALER

NOTES:
1. ANY WHALER, BRACE OR PILE SIZE WITH A LARGER S_{b3} (SECTION MODULUS) MAY BE USED IN PLACE OF THE REFERENCED WIDE FLANGE WHALER AND BRACE CALL OUT.

GENERAL NOTES

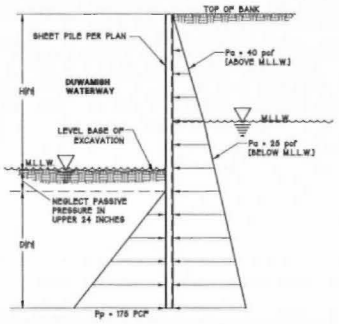


DIAGRAM (a)

JFOS IMPACTED MATERIAL EXCAVATION
CANTILEVER SHEET PILE
PRESSURE/LOADING DIAGRAM

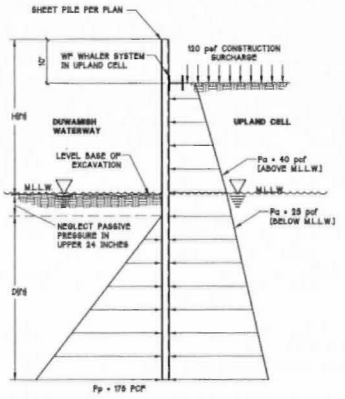


DIAGRAM (b)

JFOS IMPACTED MATERIAL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

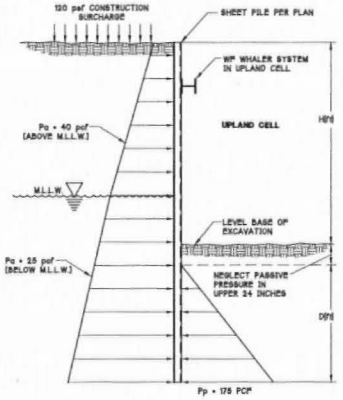


DIAGRAM (c)

UPLAND SOIL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

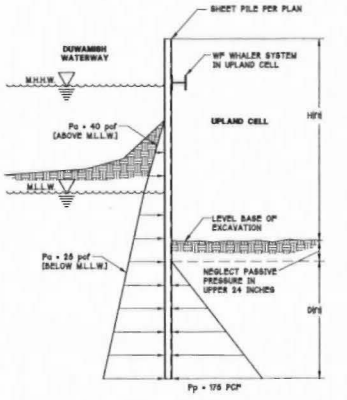


DIAGRAM (d)

UPLAND SOIL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

SHEET PILE PRESSURE/LOADING DIAGRAMS

SHEET PILE PRESSURE/LOADING DIAGRAM NOTES:
1. PASSIVE PRESSURE ASSUMED TO ACT OVER SHEET PILE WIDTH AND INCLUDES FACTOR-OF-SAFETY 1.5.
2. M.H.H.W. = MEAN HIGH HIGH WATER LEVEL IN THE DUWAMISH WATERWAY.
3. M.L.L.W. = MEAN LOW LOW WATER LEVEL IN THE DUWAMISH WATERWAY.

SHEET PILE LOADING/PRESSURE DIAGRAM NOTES

REVISIONS
DATE | DESCRIPTION

B&T ENGINEERING
B & T DESIGN & ENGINEERING, INC.
BENSCH & TRAUTMAN

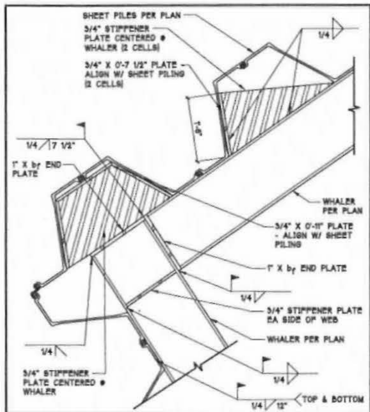
PROJECT TITLE
JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA

SHEET TITLE
OPTION 2
DETAILS & NOTES

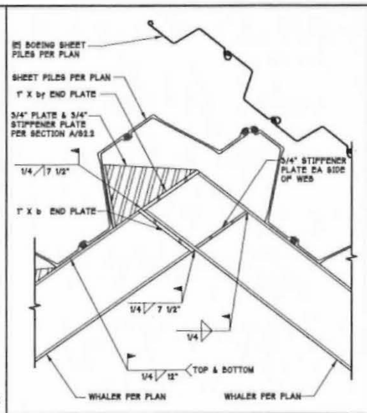
PROJECT	130923
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :
S2.1 2
OF

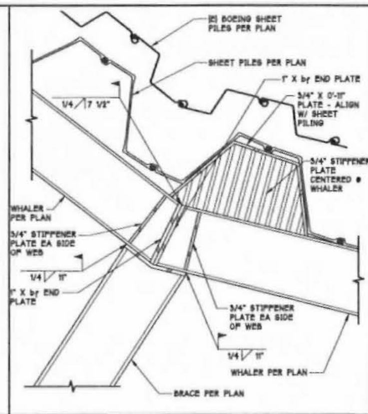
130923-S2.1 01/10/14


SHEET PILES PER PLAN
3/4" STIFFENER PLATE CENTERED @ WHALER (2 CELLS)
3/4" X 0'-7 1/2" PLATE - ALIGN W/ SHEET PILING (2 CELLS)
1/4 7 1/2"
1" X b/f END PLATE
WHALER PER PLAN
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING
1" X b/f END PLATE
3/4" STIFFENER PLATE EA SIDE OF WEB
WHALER PER PLAN
3/4" STIFFENER PLATE CENTERED @ WHALER
TOP & BOTTOM

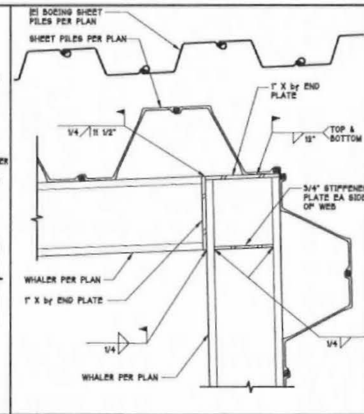
A S2.2 **DETAIL** 3/4" = 1'-0"



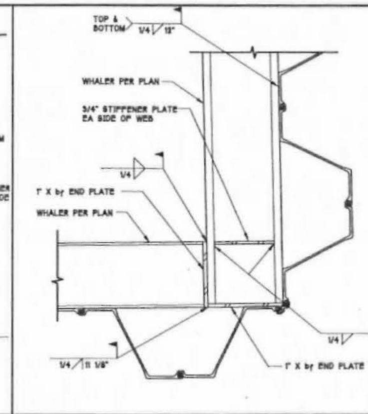
B S2.2 **DETAIL** 3/4" = 1'-0"


(E) BOEING SHEET PILES PER PLAN
SHEET PILES PER PLAN
1" X b/f END PLATE
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING
1/4 7 1/2"
3/4" STIFFENER PLATE CENTERED @ WHALER
WHALER PER PLAN
3/4" STIFFENER PLATE EA SIDE OF WEB
1/4 11"
1" X b/f END PLATE
3/4" STIFFENER PLATE EA SIDE OF WEB
1/4 11"
WHALER PER PLAN
BRACE PER PLAN

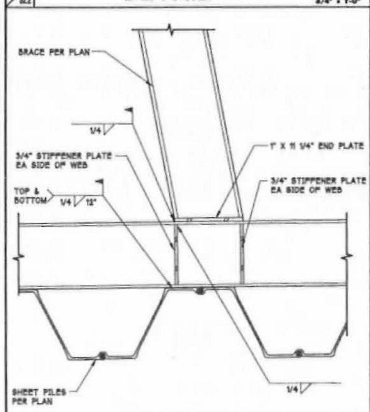
C S2.2 **DETAIL** 3/4" = 1'-0"



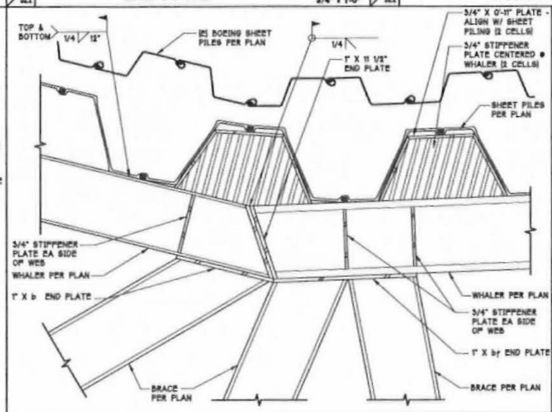
D S2.2 **DETAIL** 3/4" = 1'-0"



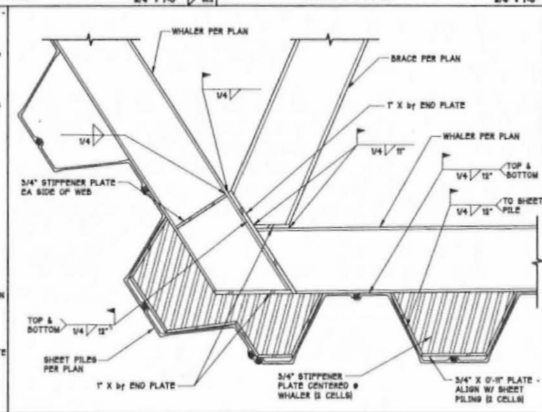
E S2.2 **DETAIL** 3/4" = 1'-0"



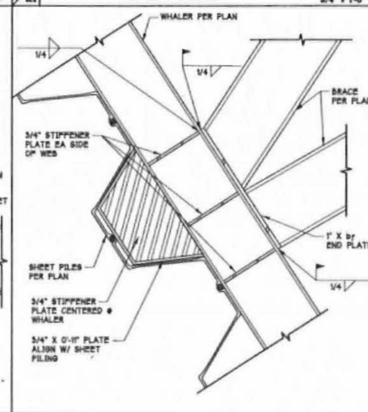
F S2.2 **DETAIL** 3/4" = 1'-0"


TOP & BOTTOM 1/4 12"
(E) BOEING SHEET PILES PER PLAN
1/4
1" X 11 1/2" END PLATE
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING (2 CELLS)
3/4" STIFFENER PLATE CENTERED @ WHALER (2 CELLS)
SHEET PILES PER PLAN
3/4" STIFFENER PLATE EA SIDE OF WEB
WHALER PER PLAN
1" X b END PLATE
WHALER PER PLAN
3/4" STIFFENER PLATE EA SIDE OF WEB
1" X b/f END PLATE
BRACE PER PLAN
BRACE PER PLAN

G S2.2 **DETAIL** 3/4" = 1'-0"


WHALER PER PLAN
BRACE PER PLAN
1/4
1" X b/f END PLATE
1/4
WHALER PER PLAN
1/4 11"
TOP & BOTTOM
3/4" STIFFENER PLATE EA SIDE OF WEB
TO SHEET PILE
TOP & BOTTOM 1/4 12"
SHEET PILES PER PLAN
1" X b/f END PLATE
3/4" STIFFENER PLATE CENTERED @ WHALER (2 CELLS)
3/4" X 0'-11" PLATE - ALIGN W/ SHEET PILING (2 CELLS)

H S2.2 **DETAIL** 3/4" = 1'-0"



J S2.2 **DETAIL** 3/4" = 1'-0"

REVISIONS

DATE	DESCRIPTION

B&T DESIGN & ENGINEERING

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA

PROJECT TITLE

OPTION 2
DETAILS

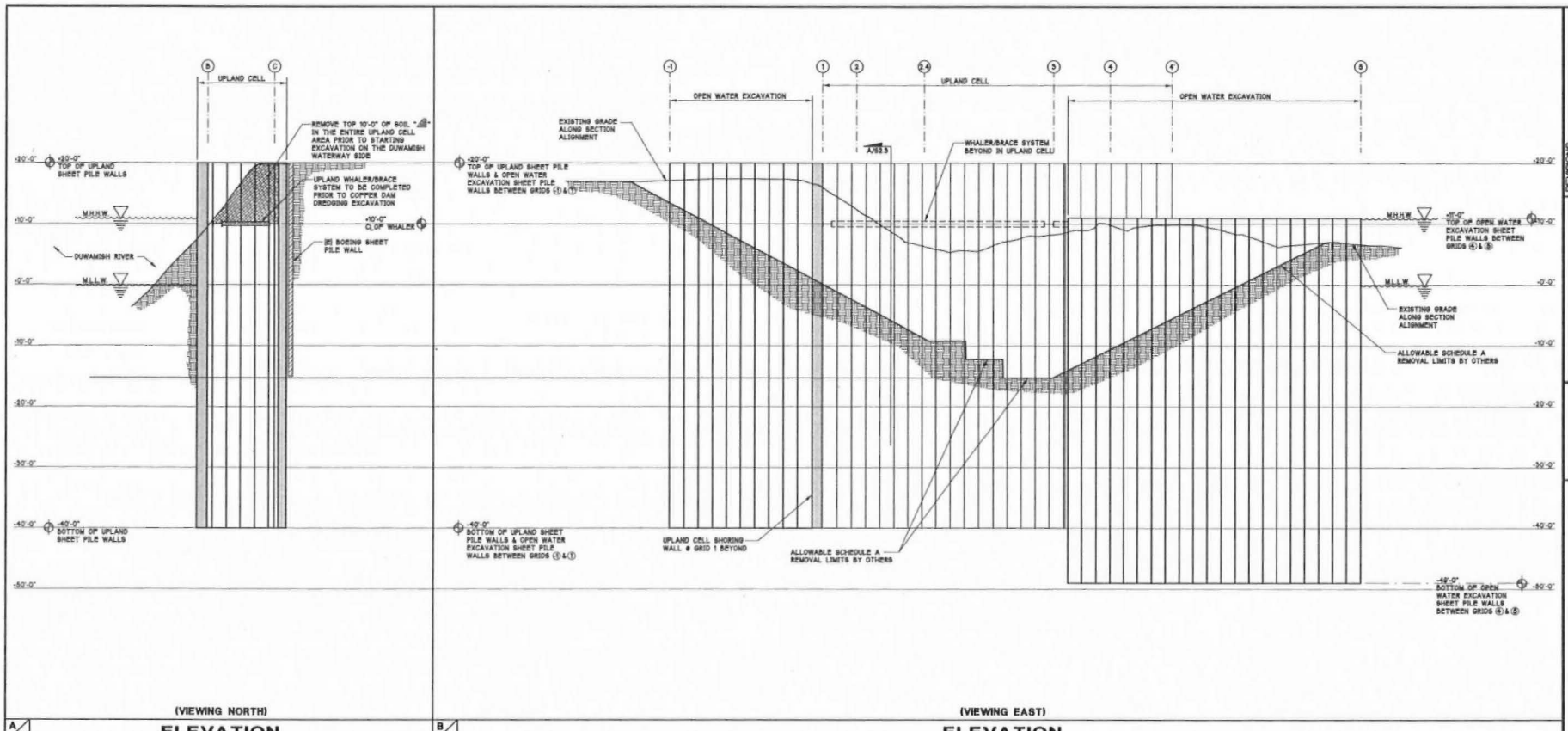
SHEET TITLE

PROJECT	13092.1
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :

S2.22

OF



(VIEWING NORTH)

A/S2.3 **ELEVATION** 1/8" = 1'-0"

(VIEWING EAST)

B/S2.3 **ELEVATION** 1/8" = 1'-0"

REVISIONS

DATE	DESCRIPTION

B&T ENGINEERING

B & T DESIGN & ENGINEERING, INC.
2361 ELLIOTT WAY
SEATTLE, WASHINGTON 98121
(425) 557-0776 (PHONE)
(425) 557-0780 (FAX)

PROJECT TITLE

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA

SHEET TITLE

OPTION 2
ELEVATIONS

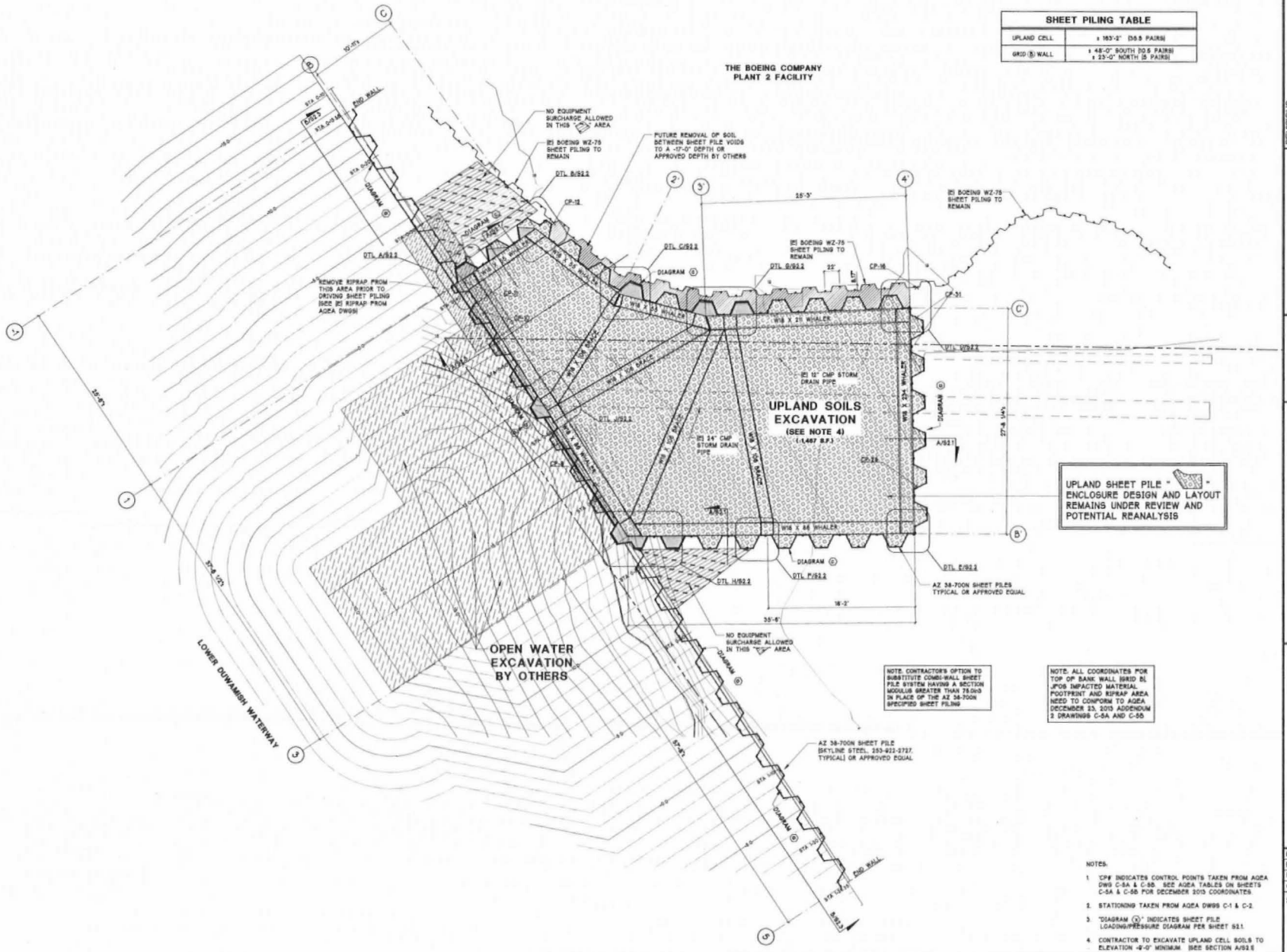
PROJECT	130921
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :

S2.3 2

OF

130921-S2.3 01/10/14



REVISIONS
DATE | DESCRIPTION

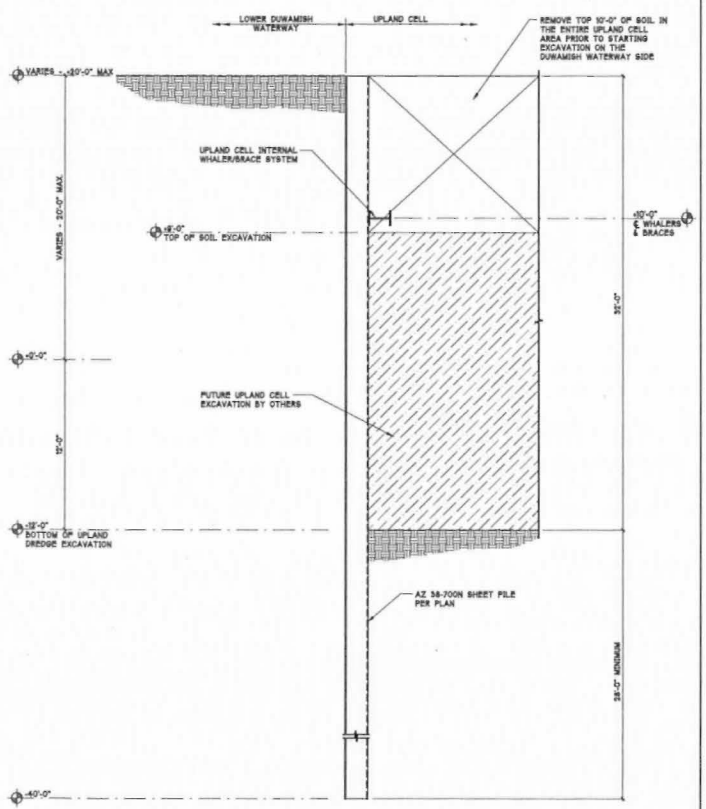
B&T DESIGN & ENGINEERING

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA
PROJECT TITLE

OPTION 2
SHORING PLAN
SHEET TITLE

PROJECT	130921
DATE	01/09/14
DRAWN	NH
CHKD.	JT

SHEET :
S1.1₂
OF



A S2.1

SECTION

1/4" = 1'-0"

GENERAL STRUCTURAL SHORING SPECIFICATIONS

GENERAL NOTE
CODE: INTERNATIONAL BUILDING CODE — 2012 EDITION
ALL ASTM'S CALLED OUT ARE TO BE THE LATEST EDITION

FOUNDATION
FOUNDATION DESIGN WAS BASED UPON SOILS REPORT NO. JN13447 BY GEOTECH CONSULTANTS, INC. DATED DECEMBER 6, 2013. THE FOLLOWING VALUES WERE USED:

LATERAL EARTH PRESSURE: ..... 40 PCF EQUIVALENT FLUID PRESSURE (ACTIVE-UNRESTRAINED)
..... 25 PCF EQUIVALENT FLUID PRESSURE (ACTIVE-UNRESTRAINED) BELOW WATER LEVEL
..... 120 PSF (EQUIPMENT SURCHARGE)
..... 175 PCF EQUIVALENT FLUID PRESSURE (PASSIVE – INCLUDES 1.5 FACTOR OF SAFETY)

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STRUCTURAL STEEL
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STRUCTURAL STEEL & STEEL PLATES TO CONFORM WITH :
ASTM A-572 (Fy = 50,000 PSI)
STRUCTURAL STEEL SHEET PILING TO CONFORM WITH :
ASTM A-572 (Fy = 50,000 PSI)
ALL WELDING TO CONFORM WITH AWS D1.1 "CODE FOR WELDING IN BUILDING CONSTRUCTION". WELDS NOT SPECIFIED SHALL BE 1/4" CONTINUOUS FILLET MINIMUM. ALL WELDS BY CERTIFIED WELDERS. USE FRESH 7000 ELECTRODES.

SPECIAL CONDITIONS
CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN FIELD AND SHALL PROVIDE ADEQUATE BRACING OF ALL STRUCTURAL MEMBERS DURING THE SHORING ERECTION. CONTRACTOR SHALL NOTIFY B & T DESIGN AND ENGINEERING, INC. OF ALL FIELD CHANGES PRIOR TO INSTALLATION OF SHORING.

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4. SHORING MEMBERS ARE DESIGNED FOR LATERAL LOADS IMPOSED BY SOIL AS DESIGNATED BY ACTIVE PRESSURES SPECIFIED BY LOADING DIAGRAMS.
5. ALL STEEL TO BE PER SPECIFICATIONS UNDER "STRUCTURAL STEEL" NOTES ABOVE.

WIDE FLANGE PILE, WHALER AND BRACE TABLE

MARK	d (in.)	bf (in.)	S^{in3}	tf (in.)	TYPE
W18 X 50	18"	7 1/2"	88.9	9/16"	WHALER
W18 X 106	18 3/4"	11 1/4"	204	15/16"	BRACE/WHALER
W18 X 130	19 1/4"	11 1/8"	256	1 3/16"	WHALER
W18 X 158	19 3/4"	11 1/4"	310	1 7/16"	WHALER

NOTES:
1. ANY WHALER, BRACE OR PILE SIZE WITH A LARGER $Sin3$ (SECTION MODULUS) MAY BE USED IN PLACE OF THE REFERENCED WIDE FLANGE WHALER AND BRACE CALL OUT.

GENERAL NOTES

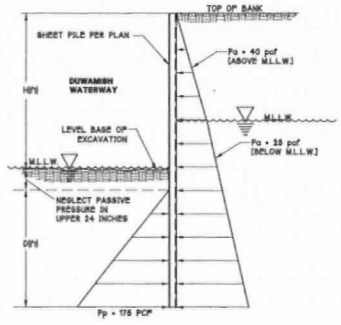


DIAGRAM (a)

JFOS IMPACTED MATERIAL EXCAVATION
CANTILEVER SHEET PILE
PRESSURE/LOADING DIAGRAM

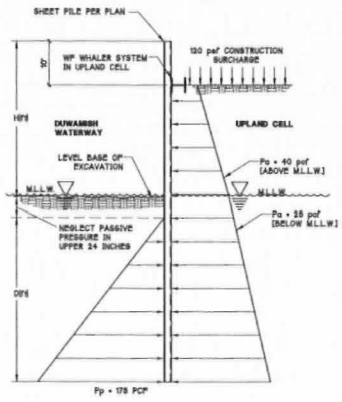


DIAGRAM (b)

JFOS IMPACTED MATERIAL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

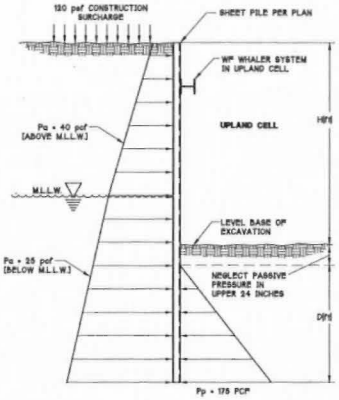


DIAGRAM (c)

UPLAND SOIL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

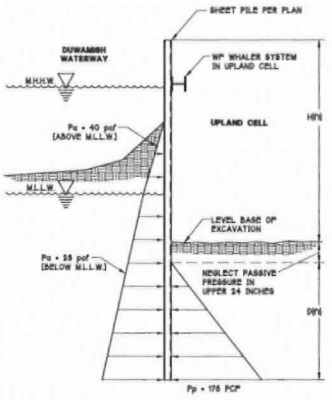


DIAGRAM (d)

UPLAND SOIL EXCAVATION
BRACED SHEET PILE
PRESSURE/LOADING DIAGRAM

SHEET PILE PRESSURE/LOADING DIAGRAMS

SHEET PILE PRESSURE/LOADING DIAGRAM NOTES:
1. PASSIVE PRESSURE ASSUMED TO ACT OVER SHEET PILE WIDTH AND INCLUDES FACTOR-OF-SAFETY 1.5.
2. M.H.H.W. = MEAN HIGH HIGH WATER LEVEL IN THE DUWAMISH WATERWAY.
3. M.L.L.W. = MEAN LOW LOW WATER LEVEL IN THE DUWAMISH WATERWAY.

SHEET PILE LOADING/PRESSURE DIAGRAM NOTES

REVISIONS	
DATE	DESCRIPTION

B&T DESIGN & ENGINEERING, INC.
7711 E. MARGINAL WAY S.
SEATTLE, WA 98108
(425) 577-6741 (FAX)
B&T DESIGN & ENGINEERING

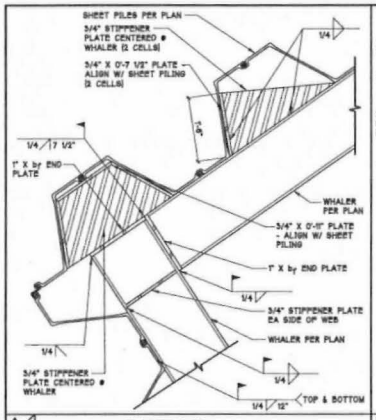
JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA
PROJECT TITLE

OPTION 2
DETAILS & NOTES
SHEET TITLE

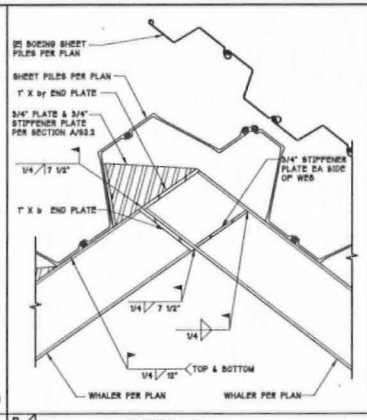
PROJECT	130921
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :
S2.12
OF

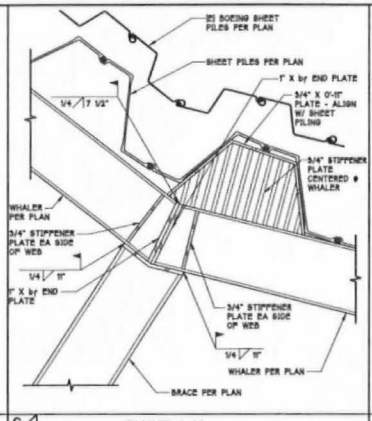
130921-12.1 01/10/14



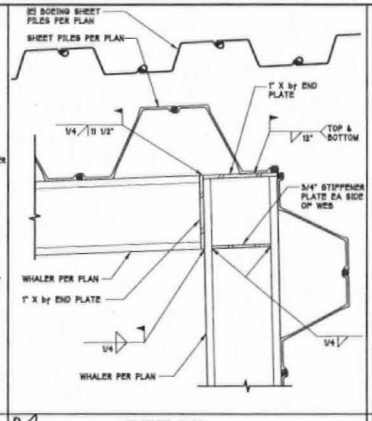
A S2.2 **DETAIL** 3/4" = 1'-0"



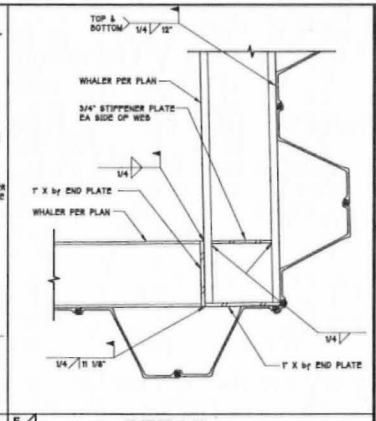
B S2.2 **DETAIL** 3/4" = 1'-0"



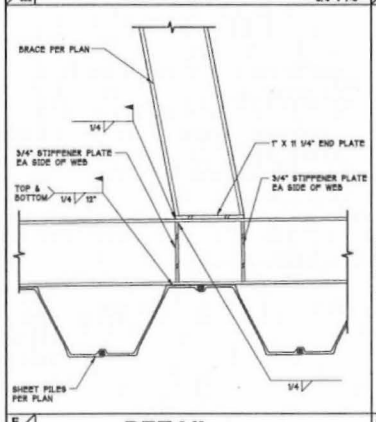
C S2.2 **DETAIL** 3/4" = 1'-0"



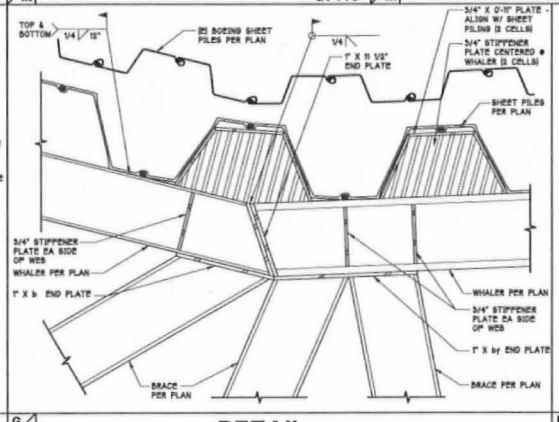
D S2.2 **DETAIL** 3/4" = 1'-0"



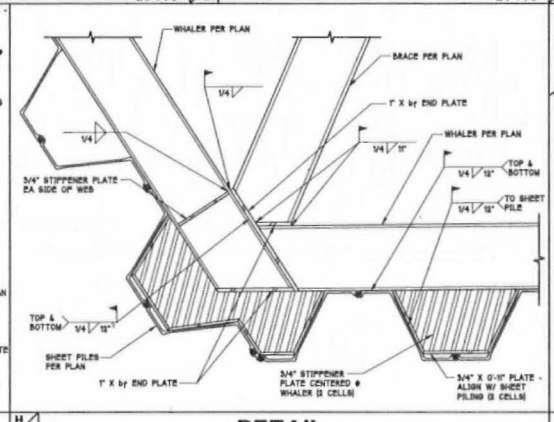
E S2.2 **DETAIL** 3/4" = 1'-0"



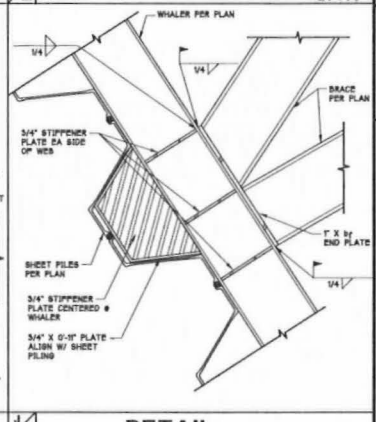
F S2.2 **DETAIL** 3/4" = 1'-0"



G S2.2 **DETAIL** 3/4" = 1'-0"



H S2.2 **DETAIL** 3/4" = 1'-0"



J S2.2 **DETAIL** 3/4" = 1'-0"

REVISIONS	
DATE	DESCRIPTION

B&T DESIGN & ENGINEERING

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA

PROJECT TITLE

OPTION 2
DETAILS

SHEET TITLE

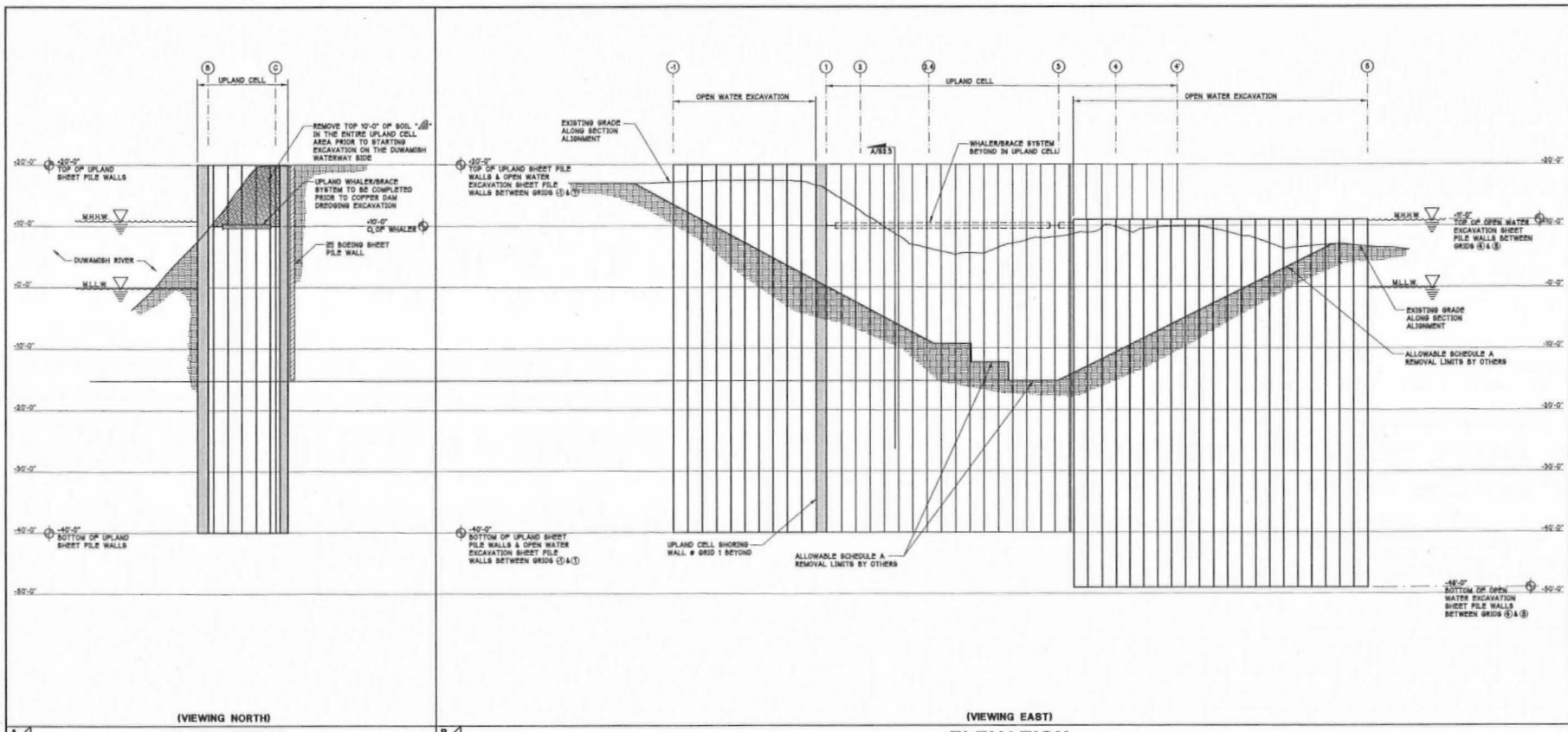
PROJECT	130921
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :

S2.22

OF

13092-S2.2 01/10/14



REVISIONS
DATE | DESCRIPTION

B&T DESIGN & ENGINEERING

JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY
SEATTLE, WA
PROJECT TITLE

OPTION 2
ELEVATIONS
SHEET TITLE

PROJECT	13092.1
DATE	01/10/14
DRAWN	NH
CHKD.	JT

SHEET :
S2.3 2
OF

13092-S2.3 01/10/14